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PHARMACY MANPOWER IN THE WEST:

AN ANALYSIS OF SUPPLY AND DEMAND

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Western Interstate Commission for Higher Education

WICHE, the Western Interstate Commission for Higher Education, is a nonprofit regional organization dedicated to helping fourteen western states to work together to provide high-quality, cost-effective programs to meet the education and manpower needs of the region. Member states are Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; North Dakota is an affiliated state. Through its Information Clearinghouse, which produced this report, WICHE provides information to higher education and government officials as they address important policy issues in the West.

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FOREWORD

Historically, the number of new pharmacists trained in the western states has not met the needs of this growing region. Over the years, significant numbers of pharmacists trained elsewhere have moved to the West, filling as many as one-half of the available positions. This new study by the Western Interstate Commission for Higher Education (WICHE) indicates that this gap between regional needs and the supply of new pharmacists trained in the region may widen over the next fifteen years.

These projections become available when pharmacy schools in the West, as well as across the nation, are attempting to cope with several years of declining enrollments and also adjust to more demanding educational objectives in the profession. In this environment, pharmacy schools, the profession, and certain geographical areas and states may experience severe strain in the next few years in meeting the needs for pharmacy services.

WICHE undertook this study as part of its long-standing mission to assess professional manpower needs in the West and to assist in meeting those needs for the region and for individual states. Weaknesses in the available data for the field of pharmacy complicated the process of projecting future supply and demand and lengthened the time required to prepare this report. The development of a stronger database for the field of pharmacy should be undertaken to provide firmer ground for future studies and planning efforts.

In addition, consideration should be given to greater collaboration among states and schools as a cost-effective response to resolve some of the dilemmas pressing on state policymakers and educators in pharmacy. With some schools weakened by declining enrollments and diminishing resources, the increased use of imaginative and innovative regional arrangements offers the potential of assuring high-quality education for a greater number of students while easing the burden on educational budgets of individual states.

WICHE presents these supply and demand projections, as well as their implications, in the interest of sound educational policymaking across the 14-state region.

Boulder, Colorado
November 1985

Phillip Sirotkin
Executive Director
Western Interstate Commission
for Higher Education

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WICHE is indebted in this research effort to a number of individuals and organizations. The late William R. McConnell of the WICHE staff set the research agenda and gathered preliminary data. Stuart Bernstein of the U.S. Department of Health and Human Services provided information crucial to the analysis of future supply and demand. Staff of the American Association of Colleges of Pharmacy assisted in several ways, among them arranging for a number of persons in its member institutions to review an early draft of this report. Early drafts also were reviewed by William L. Blockstein of the University of Wisconsin, John Folger of Vanderbilt University, and Roslyn Elms of the California Postsecondary Education Commission. Pharmacy deans Jack R. Cole of the University of Arizona and Richard A. Ohvall of Oregon State University reviewed a subsequent draft.

The assistance of these individuals and others in federal and state government agencies allowed WICHE to develop a model of supply and demand for pharmacists that can facilitate continuing efforts to promote cost-effective, high-quality programs in the western states.

EXECUTIVE SUMMARY

This report is a study of pharmacy education and manpower in the WICHE states.

Findings are presented in four areas:

1. The training of pharmacists in the WICHE region;
2. Projections of the regional annual supply of new pharmacy graduates;
3. Projections of the regional annual demand for new or additional pharmacists; and,
4. A comparison of the projected annual supply of new pharmacy graduates with the projected annual demand for additional pharmacists.

TRAINING

- Enrollment trends in professional pharmacy programs in the WICHE region have generally paralleled those for the nation as a whole. Enrollments in the region increased between 1973-74 and 1975-76, and then began a sharp and continual decline.[1]

- The representation of females in professional pharmacy programs in the WICHE states has increased dramatically since 1973-74, and females now constitute a majority (51 percent) of enrollments in professional pharmacy programs. Women constitute approximately 53 percent of professional enrollments nationwide.

- As is true for the nation as a whole, Blacks, Hispanics, and American Indians are consistently underrepresented in professional pharmacy programs in the WICHE states relative to their proportion of the general population. In sharp contrast, Asians are well represented in pharmacy programs in most states.

- The number of professional pharmacy degrees conferred in the WICHE region increased between 1972-73 and 1976-77, and then began a steady decline. Trends in the WICHE region generally paralleled those for the nation as a whole.

- Most students enrolled in professional pharmacy programs in the WICHE states are in-state residents (approximately 80 percent for the region as a whole). Students from other WICHE states are the next largest group, followed by students from non-WICHE states and foreign students.

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[1]As in several other professions, professional degree programs in pharmacy are commonly called first professional programs (to distinguish them from graduate programs in the field), and are referred to as such in this report.

- Currently, approximately 90 percent of the professional pharmacy students from the WICHE region enroll in pharmacy programs in their home states.

- States vary with respect to enrollment trends (see Charts 1 and 2).

SUPPLY

- Although future events may alter trends in the production of new pharmacy graduates, the annual supply of new pharmacy graduates in the WICHE region is expected to decline approximately 17 percent between 1985 and 1995 and then generally stabilize through the year 2000. This generally parallels projected trends for the nation as a whole. There will be an annual supply of approximately 725 new pharmacy graduates in the WICHE region by the year 2000.

DEMAND

- Based on the projection methods used in this study, the annual demand for new or additional pharmacists in the WICHE region will increase around 9 percent between 1985 and 2000. There will be an annual demand for approximately 1,740 new pharmacists in the region by the year 2000.

COMPARISON OF PROJECTED SUPPLY AND PROJECTED DEMAND

- As has been true in the past for the region as a whole, the annual demand for additional pharmacists is expected to exceed the annual supply of new pharmacy graduates by more than 1,000 pharmacists by the end of the century. None of the WICHE states except Idaho, North Dakota, and Wyoming are expected to produce enough new pharmacy graduates to meet their own needs.

- The excess of projected job openings relative to the supply of new pharmacy graduates does not necessarily mean that the WICHE region will experience a shortage of pharmacists. A large proportion of the supply of new pharmacists in the WICHE region comes from outside the region. The relationship between supply and demand can be expected to remain in balance through the rest of this decade and the 1990s if states are able to increase enrollments in existing schools of pharmacy or import an increasing number of new pharmacists from other states.

- A number of other factors, including changes in demographic patterns, pharmacists' roles, and pharmacy education, may alter the projected balance between supply and demand. Policymakers will need to monitor the effects of such factors in using these comparisons of supply and demand to enhance long-range planning efforts.

CONCLUSION: A REGIONAL APPROACH TO ADDRESSING MANPOWER PROBLEMS

- Regional cooperation can help to address many of the problems facing pharmacy education in the next 15 years. Some of the issues to be addressed include:

  —The development of a strong database for the field of pharmacy;

  —The implications of the projected deficit of new pharmacy graduates from the region's pharmacy schools relative to the demand for additional pharmacists;

  —The extent of interstate migration of pharmacists and appropriate levels of reliance on in-migrating pharmacists;

  —Future developments in pharmacy education, pharmacy practice, health care delivery, and population demographics which may influence the demand for pharmacy manpower; and,

  —Consideration of regional pharmacy programs as an innovative, cost-effective means of adapting to declining enrollments, increasing costs, and more demanding professional objectives.

Chart 1

Recent Trends in First Professional Pharmacy Training in the WICHE States

State	Enrollment (1973-74 through 1983-84)			Number of Degrees Conferred (1972-73 through 1982-83)	Geographical Origin of Students Enrolled in Programs in the WICHE States	Percent Enrolled in Home State	Net Inflow or Outflow of Students to Other States
	Total Enrollment	Enrollment by Race/ Ethnic Group	Enrollment by Sex				
Arizona	Declined through 1981-82, then increased slightly	Blacks, Hispanics, and American Indians generally underrepresented; Asians generally well represented	Percent female increased from 22 to 58 percent	Fluctuated through 1976-77, then decreased	88-99 percent were from the WICHE region; 80-98 percent were state residents in most years	91-97 percent	Net inflow between 1973-74 and 1977-78, and net outflow between 1978-79 and 1982-83
California	Increased through 1976-77, then decreased slightly	Same as Arizona	Percent female increased from 30 to 55 percent	Generally increased through 1980-81; declined in 1981-82 and increased in 1982-83	91-96 percent were from the WICHE region; 88-93 percent were state residents	76-88 percent	Net outflow in all years
Colorado	Increased slightly through 1980-81, then decreased	Same as Arizona	Percent female increased from 29 to 52 percent	Generally stable, with a slight increase in 1979-80	87-93 percent were from the WICHE region; 82-90 percent were state residents	82-89 percent	Fluctuated
Idaho	Fluctuated through 1976-77, then decreased sharply	Hispanics and American Indians generally underrepresented; Asians generally well represented	Percent female increased from 16 to 36 percent	Increased through 1976-77, then decreased; recent sharp decrease	73-87 percent were from the WICHE region; only 35-48 percent were state residents in most years; 8-13 percent were foreign	87-95 percent	Net inflow in all years
Montana	Stable through 1979-80, then decreased slightly	Hispanics and American Indians generally underrepresented	Percent female increased from 35 to 51 percent	Generally stable, with a slight overall increase through 1975-76 followed by a slight overall decrease	73-89 percent were from the WICHE region; 59-69 percent were state residents in most years	91-98 percent	Net inflow in all years
New Mexico	Fluctuated through 1979-80 then decreased sharply; increased in 1983-84	Same as Arizona	Percent female increased from 16 to 42 percent then down to 36 percent	Generally increased slightly through 1976-77, then decreased	75-85 percent were from the WICHE region in most years; 63-72 percent were state residents in most years	89-100 percent	Net inflow in most years
North Dakota	Peaked in 1974-75, sharp decline through 1982-83; increased in 1983-84	Virtually no minority enrollment	Percent female increased from 24 to 46 percent	Increased through 1976-77, then dropped sharply; up in 1982-83	47-64 percent were from the WICHE region; 47-62 percent were state residents	93-99 percent	Net inflow in all years
Oregon	Increased through 1977-78, then decreased; increased in 1983-84	Same as Arizona	Percent female increased from 30 to 50 percent	Generally increased through 1977-78, then decreased, recent fluctuations	88-92 percent were from the WICHE region; 70-81 percent were state residents	93-98 percent	Net inflow in all years
Utah	Decreased in all years except 1974-75 and 1977-78	Same as Arizona	Percent female increased from 20 to 42 percent	Increased through 1975-76, then generally decreased; slight upturn in 1982-83	89-95 percent were from the WICHE region; 70-83 percent were state residents in most years	96-99 percent	Net inflow in all years
Washington	Generally stable through 1979-80, then decreased sharply	Same as Idaho	Percent female increased from 35 to 55 percent	Increased through 1977-78, then generally decreased	92-98 percent were from the WICHE region; 86-93 percent were state residents	96-98 percent	Net inflow in all years
Wyoming	Increased through 1975-76, then decreased sharply	Same as Arizona	Percent female increased from 21 to 51 percent, then down to 44 percent	Increased through 1976-77, decreased sharply in 1978-79, then stabilized until sharp decrease in 1982-83	56-62 percent were from the WICHE region; 38-50 percent were state residents	90-99 percent	Net inflow in all years
WICHE Region	Increased through 1975-76, then decreased sharply	Same as Arizona	Percent female increased from 27 to 51 percent	Increased through 1976-77 then decreased	89-90 percent were from the WICHE region; 77-82 percent were state residents	85-91 percent	Net inflow in all years

Chart 2

Recent Trends in Graduate-Level Pharmacy Training in the WICHE States

State	Enrollment (1973-74 through 1983-84)		Number of Degrees Conferred (1972-73 through 1982-83)	Geographical Origin of Students Enrolled in Programs in the WICHE States	Percent Enrolled in Home State	Net Inflow or Outflow Of Students to Other States
	Total Enrollment	Enrollment by Race/Ethnic Group				
Arizona	Generally increased through 1980-81, then fluctuated; sharp increase in 1983-84	Blacks, Hispanics, and American Indians underrepresented; enrollment of Asians fluctuated	Generally stable except for sharp increase in 1982-83	57-70 percent were from the WICHE region in most years; 43-60 percent were state residents in most years	75-91 percent in most years	Net inflow in most years
California	Generally stable through 1977-78, then increased	Blacks, Hispanics, and American Indians generally underrepresented; Asians generally well represented	Great fluctuations	49-70 percent were from the WICHE region in most years; 46-68 percent were state residents in most years; 16-40 percent were foreign	68-83 percent in most years	Net inflow in all years
Colorado	Generally stable, but increased through 1977-78 and then fluctuated slightly	All minority groups generally underrepresented	Generally stable, small number	Fluctuated considerably in percentage from the WICHE region (54-90 percent) and percentage of state residents (36-90 percent); 10-27 percent were foreign	57-78 percent in most years	Net outflow in most years
Idaho	Generally stable	No minority enrollment	Generally stable, mode is one degree granted per year	Fluctuated considerably in percentage from the WICHE region (20-80 percent) and percentage of state residents (20-80 percent); as many as 60 percent were foreign	33-50 percent in most years	No consistent pattern
Montana	Generally stable, low total	No minority enrollment	0-1 degree per year	100 percent were foreign in most years	Fluctuated considerably, generally 0	No consistent pattern
North Dakota	Peaked in 1973-74, then declined; slight upturn in 1983-84	No minority enrollment	Generally stable	29-50 percent were state residents in most years; virtually none were from other WICHE states; 12-53 percent were foreign	56-100 percent, wide fluctuations	Net inflow in all years
Oregon	Fluctuated considerably, but generally increased slightly through 1981-82, then stable	All minority groups generally underrepresented	Generally stable, up since 1979-80	Over 50 percent were from the WICHE region before 1979-80, and less than 50 percent were from the WICHE region after 1979-80; percent state residents also dropped sharply; 5-43 percent were foreign	42-63 percent in most years	Net inflow in most years
Utah	No consistent pattern; up sharply in 1983-84	Blacks, Hispanics, and American Indians underrepresented; Asians well represented in recent years	Generally stable through 1977-78, then increased slightly until 1980-81; decreased since then	48-65 percent were from the WICHE region in most years; the percentage of state residents fluctuated considerably (13-68 percent); 19-38 percent were foreign	67-90 percent in most years	Net inflow in all years
Washington	Generally increased after 1976-77; declined in 1983-84	Blacks, Hispanics, and American Indians generally underrepresented; Asians generally well represented	Generally stable, but increased slightly after sharp drop in 1976-77; decreased in 1981-82 and 1982-83	60-70 percent were from the WICHE region; 41-58 percent were state residents in most years; 13-23 percent were foreign	67-81 percent	Net inflow in all years
WICHE Region	Fluctuated through 1976-77, increased through 1980-81, then leveled off; sharp increase in 1983-84	Blacks, Hispanics, and American Indians underrepresented; enrollment of Asians fluctuated	Wide fluctuations due to influence of California	52-60 percent were from the WICHE region; 37-63 percent were state residents	67-75 percent in most years	Net inflow in all years

INTRODUCTION

This report examines pharmacy education and manpower in the 14 states that are members or affiliates of the Western Interstate Commission for Higher Education (WICHE): Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota (affiliate), Oregon, Utah, Washington, and Wyoming. Specifically, the report reviews historical trends in the training of pharmacists in the 14 states and compares the projected demand for new or additional pharmacists in the WICHE states with the projected supply of new pharmacy graduates. Unfortunately, pharmacy suffers from a paucity of reliable manpower data on which pharmacy leaders and educators can base effective policy decisions. The purpose of this study is to provide data for educational, legislative, and industrial planners as a tool for better informed policymaking.

Pharmacy Education

All states require that licensed pharmacists graduate from an accredited professional pharmacy degree program, pass a state licensing examination, and complete an internship program or specified amount of practical experience under the supervision of a registered pharmacist. Two different types of degrees are offered by schools of pharmacy--first professional degrees and graduate degrees. The two first professional degrees, the Bachelor of Science in Pharmacy (or Bachelor of Pharmacy) and Doctor of Pharmacy, are normally the minimum credential necessary for entry into the profession. Graduate programs are offered at the master's and doctoral levels (Ph.D. or graduate-level Doctor of Pharmacy) and are more specialized than first professional degree programs. The principal specialties at the master's and doctoral levels include the following: pharmacy/pharmaceutics, medicinal/pharmaceutical chemistry, pharmacognosy, pharmacology, pharmacy administration, and hospital pharmacy.

Prior to the Elliott Report in 1950, there were many approaches to the education of pharmacists. Although that report called for a six-year curriculum, the majority of professional schools and colleges settled upon five-year bachelor's programs. Two colleges in California established six-year Doctor of Pharmacy curricula, and several other pharmacy schools subsequently followed suit. (However, only seven schools nationwide offer the six-year Doctor of Pharmacy degree as the sole first professional degree program.) The sixth year often has a heavy concentration in clinical pharmacy courses and clinical experience.

The Final Report of the Task Force on Pharmacy Education (American Pharmaceutical Association, 1984) recommends that the six-year Doctor of Pharmacy curriculum become the sole entry-level degree program for the profession. It is unclear what effect the lengthening of the curriculum in all or a majority of pharmacy programs would have on the supply of new pharmacy graduates. Some experts anticipate that switching to a six-year program may have a negative impact on enrollments and degrees granted in many schools of

pharmacy. While there has been some movement toward six-year Doctor of Pharmacy curricula nationwide, a majority of schools (65 of 72) still offer the five-year baccalaureate in pharmacy.

The Nature of the Pharmacist's Role

Newly licensed pharmacists with first professional degrees usually seek positions in independent community pharmacies, large chain pharmacies, or pharmacies in hospitals, clinics, and nursing homes. Pharmacists with graduate degrees generally work in their areas of specialty, performing research for governmental agencies, pharmaceutical manufacturers, medical schools, and pharmacy schools; teaching in medical, nursing, or pharmacy schools; or engaging in pharmacy administration. The principal employment distribution of active pharmacists in 1982 is shown in Table 1.

The majority of active pharmacists practice in community or chain pharmacies, and the nature of their practice has changed over time. In addition to the primary functions of consultation and dispensing medication, there is evidence that newer pharmacists spend more of their time advising physicians and patients about drugs and their effects. Much of this shift can be traced to the increased emphasis upon clinical applications in pharmacy education. This clinical emphasis has evolved partly due to concerns that pharmacists in typical work settings are not using their full range of skills.

A parallel development is the rise in the number of pharmacists working in hospital, medical, and clinical pharmacies. Between 1966 and 1978 the proportion of pharmacists working in such settings more than doubled.

The result of these trends is that the responsibilities of the pharmacist as a primary care provider are increasing. Pharmacists increasingly supervise drug usage by patients and guard against adverse effects of drugs. Increasing numbers of pharmacists are also establishing office-based practices to make use of their clinical skills in advising patients and physicians. Such trends are reflected in changing laws and licensure procedures to allow for the expanded roles.

Increased emphasis upon clinical, consultative, and administrative duties may cause the demand for pharmacists to increase. The complexity of new pharmaceuticals may cause pharmacists to devote more of their time to keeping current with new developments and advising patients and physicians about drug effects and interactions. On the other hand, increased use of computers in business applications and in providing information about drug effects, drug interactions, patient drug profiles, and inventories of pharmaceuticals and supplies may have the effect of enhancing the efficiency and effectiveness of practicing pharmacists.

The increased use of pharmacy assistants has also contributed to changes in the pharmacist's role. Growth in new programs to train such assistants is of major proportions. As noted by the Task Force on Pharmacy Education,

> Economic pressures on the health care system will expand the utilization of supportive personnel in distributive supply-related tasks in pharmacy practice...The purpose of supportive personnel in

Table 1

U.S. Distribution of Active Pharmacists
by Principal Employment Setting, 1982

Principal Employment Setting	All Active Pharmacists	
	Number	Percent
TOTAL ACTIVE PHARMACISTS	151,400	100.0
Independent Community Pharmacies	59,040	39.0
Chain Pharmacies	43,790	28.9
Clinic or Medical Building Pharmacies	6,130	4.1
Hospitals	30,280	20.0
Nursing Homes	2,390	1.6
Pharmaceutical Manufacturers	3,830	2.5
Colleges of Pharmacy	2,000	1.3
Other	3,940	2.6

Source: U.S. Department of Health and Human Services, Report to the President and Congress on the Status of Health Personnel in the United States, Table B-6-1, May 1984.

> pharmacy practice is to relieve pharmacists of technical nonjudgmental tasks in the distribution of drugs so that pharmacists may more effectively utilize personnel, control costs, and become more involved in patient drug therapy (American Pharmaceutical Association, 1984).

It is unclear to what extent the increased usage of pharmacy assistants or other supportive personnel affects the demand for pharmacists. The use of assistants and supportive personnel theoretically allows pharmacists to spend more of their time on clinical and administrative duties. But by enhancing work efficiency, pharmacy assistants may also reduce manpower demand.

The Practice of Pharmacy in the WICHE States

In 1982, the WICHE states awarded approximately 13 percent of all pharmacy degrees received in the United States. In comparison, the WICHE states have approximately 21 percent of the United States population and 16 percent of all practicing pharmacists. The U.S. Department of Health and Human Services estimates that there were 24,362 active pharmacists in the WICHE states in 1982.

Pharmacist-to-population ratios in the WICHE states range from a low of approximately 32 per 100,000 population in Hawaii (the lowest in the nation) to more than 82 per 100,000 population in North Dakota (only Nebraska, Rhode Island, and the District of Columbia have higher ratios). Table 2 presents the number of active pharmacists and ratio of pharmacists per 100,000 population in the WICHE states in 1970, 1980, and 1982.

As Table 2 shows, the ratio of pharmacists per 100,000 population in the WICHE region as a whole is significantly below the national average. Fluctuations in pharmacist-to-population ratios are associated with many factors, two of which are the size of the rural population and the proportion of elderly in the population. California, with its relatively young and urban population, has a comparatively low ratio. Since California has nearly one-half of the pharmacists in the region, the WICHE states without California would have a ratio slightly above the national average. As Table 2 shows, California's ratio has declined since 1970. This explains why the ratio in the region as a whole has changed very little over time although the ratios in most WICHE states and the country as a whole have shown significant increases.

Pharmacy Education in the WICHE States

Fourteen universities in 11 WICHE states have degree programs in pharmacy--all 14 offer professional degrees and 12 offer graduate degrees. All WICHE states except Alaska, Hawaii, and Nevada have their own pharmacy schools. Table 3 lists the various pharmacy programs in the WICHE states.

The field of pharmacy is included in WICHE's Professional Student Exchange Program (PSEP). This program enables a number of students to enroll in pharmacy programs in other WICHE states if pharmacy training is not available in their home state. Through the exchange, participating students receive some degree of preference in admission and pay resident or subsidized tuition rates. The students' home states pay support fees to the schools receiving

Table 2

Number of Active Pharmacists and Pharmacists Per 100,000 Population in the WICHE States, 1970, 1980, and 1982

State	1970 Active Pharmacists	1970 Ratio per 100,000 Population	1980 Active Pharmacists	1980 Ratio per 100,000 Population	1982 Active Pharmacists	1982 Ratio per 100,000 Population
Alaska	66	21.6	158	38.7	173	40.7
Arizona	930	51.8	1,835	66.4	1,902	66.0
California	9,790	48.8	10,189	42.5	10,769	43.4
Colorado	1,419	63.7	1,896	64.6	1,940	63.5
Hawaii	221	28.5	294	30.2	316	31.6
Idaho	476	66.3	567	59.5	600	61.5
Montana	328	47.0	592	74.8	628	78.5
Nevada	284	57.4	380	46.0	405	45.1
New Mexico	496	48.4	737	55.7	779	57.0
North Dakota	423	68.3	494	75.3	547	82.3
Oregon	1,399	66.5	1,796	67.9	1,885	70.5
Utah	651	61.0	1,096	73.3	1,152	72.7
Washington	2,205	64.5	2,798	66.9	2,896	67.0
Wyoming	236	70.6	336	69.4	370	71.6
WICHE Region	18,924	53.2	23,168	52.3	24,362	53.3
WICHE Region w/o Calif.	9,134	58.9	12,979	63.9	13,593	65.0
Total U.S.	112,570	55.4	142,780	62.5	149,630	64.3

Source: U.S. Department of Health and Human Services, Report to the President and Congress on the Status of Health Personnel in the United States, Table B-6-2, May 1984.

Table 3

Pharmacy Programs in the WICHE States, 1985

State	University	Degrees Offered: First Professional	Degrees Offered: Graduate
Arizona	University of Arizona	B.S., Pharm.D.	M.S., Ph.D.
California	University of California	Pharm.D.	M.S., Ph.D.
	University of the Pacific	B.S., Pharm.D.	M.S., Ph.D.
	University of Southern California	Pharm.D.	M.S., Ph.D.
Colorado	University of Colorado	B.S.	M.S., Ph.D.
Idaho	Idaho State University	B.S.	M.S.
Montana	University of Montana	B.S.	M.S.
New Mexico	University of New Mexico	B.S.	
North Dakota	North Dakota State University	B.S.	M.S., Ph.D.
Oregon	Oregon State University	B.S.	M.S., Ph.D.
Utah	University of Utah	B.S., Pharm.D.	M.S., Ph.D.
Washington	University of Washington	B.S., Pharm.D.	M.S., Ph.D.
	Washington State University	B.P.	M.S., Ph.D.
Wyoming	University of Wyoming	B.S.	

B.S. = Bachelor of Science in Pharmacy
B.P. = Bachelor of Pharmacy
Pharm.D. = Doctor of Pharmacy
M.S. = Master of Science
Ph.D. = Doctor of Philosophy

Note: No pharmacy schools in Alaska, Hawaii, and Nevada.

the students. Alaska and Hawaii support some of their pharmacy students enrolled in other WICHE states through the PSEP, but Nevada does not. This means that residents of all WICHE states except Nevada have some degree of access to pharmacy education at in-state tuition levels in public institutions and considerably reduced levels in private institutions.

The following study is divided into four chapters. Chapter 1 presents historical data on the training of pharmacists in the WICHE states. Chapter 2 presents projections of the annual supply of new pharmacy graduates in the WICHE states. Chapter 3 presents projections of the annual demand for new or additional pharmacists in the region, and Chapter 4 compares the supply of new pharmacy graduates with the demand for additional pharmacists. A conclusion suggests consideration of regional approaches to help address manpower concerns in pharmacy. The appendices present the projection methodology and numerous state-level statistical data.

1. THE TRAINING OF PHARMACISTS IN THE WICHE STATES

The American Association of Colleges of Pharmacy (AACP) annually collects and reports data on enrollments and degrees conferred for all accredited pharmacy schools in the United States. This chapter uses AACP enrollment data for 1973-74 through 1983-84 and degree data for 1972-73 through 1982-83 to document trends in the WICHE states in four major areas:

- Total pharmacy enrollments in the WICHE states;
- Enrollment by racial/ethnic group and sex;
- Number of pharmacy degrees conferred in the WICHE states; and
- Geographical origin of students enrolled in pharmacy programs in the WICHE states.

Each of these topics is discussed with respect to both first professional and graduate-level pharmacy programs in the WICHE states. In most cases, trends at the first professional level are discussed separately from trends at the graduate level since most practicing pharmacists have first professional degrees while many pharmacists with graduate degrees go into teaching, research, or administration. In fact, many graduate-level pharmacy programs are open to students without professional pharmacy degrees. Although graduate programs in pharmacy are very small in comparison to first professional programs, both types of degree programs are important to state policymakers in that they generally receive significant state financial support at public institutions.

Total Enrollments

Tables 4 and 5 and Figure 1 trace enrollment patterns in the WICHE states' pharmacy programs between 1973-74 and 1983-84. Table 4 shows the number of pharmacy students who were enrolled in each state by level of program (first professional or graduate) and year, and Table 5 shows the percent change in enrollments between 1973-74 and 1983-84. Enrollment trends in the region as a whole are illustrated in Figure 1.

Enrollment patterns at the first professional and graduate-levels are discussed separately below. The discussion of first professional enrollments includes only students enrolled in the final three years of pharmacy training (the numbers reported in AACP publications).

First Professional Level. According to data compiled by the American Association of Colleges of Pharmacy (AACP), total enrollments in first professional pharmacy programs have shown a continual decline in the nation as a whole since 1975. Nationwide, first professional enrollments declined 11.5 percent between 1973-74 and 1983-84. As Tables 4 and 5 show, enrollment trends in the WICHE region have generally paralleled those of the nation as a whole. Total enrollments in the WICHE region have shown a continual decline since 1975-76, after increasing substantially between 1973-74 and 1975-76

Table 4

Enrollment in Pharmacy Programs in the WICHE States*

State	Level	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84
Arizona	First Prof.	263	287	283	219	185	171	163	162	151	157	164
	Graduate	32	5	7	10	14	26	NA	69	49	53	88
California	First Prof.	1,193	1,234	1,292	1,329	1,320	1,321	1,303	1,272	1,245	1,232	1,201
	Graduate	112	105	105	101	96	126	NA	130	134	135	144
Colorado	First Prof.	157	173	172	182	187	193	205	208	199	191	171
	Graduate	11	11	13	15	19	12	NA	18	26	20	18
Idaho	First Prof.	230	279	259	262	254	235	220	173	136	98	87
	Graduate	7	6	6	5	10	10	NA	4	5	8	5
Montana	First Prof.	116	127	131	130	130	127	129	122	110	106	96
	Graduate	3	3	3	1	1	2	NA	0	1	2	3
New Mexico**	First Prof.	140	177	200	172	163	169	172	156	131	108	121
North Dakota	First Prof.	375	419	408	360	353	315	243	224	197	189	214
	Graduate	28	26	22	17	16	17	NA	17	12	10	12
Oregon	First Prof.	281	276	305	326	335	322	310	308	274	250	260
	Graduate	16	10	22	16	20	26	NA	23	30	29	30
Utah	First Prof.	222	232	216	211	220	210	193	170	143	137	130
	Graduate	33	16	23	28	35	31	NA	37	29	21	46
Washington	First Prof.	409	449	451	448	456	449	440	403	367	337	322
	Graduate	50	48	50	40	43	54	NA	57	63	67	56
Wyoming**	First Prof.	145	148	207	192	147	117	129	111	105	79	72
WICHE Region	First Prof.	3,531	3,801	3,924	3,831	3,750	3,629	3,507	3,309	3,058	2,884	2,838
	Graduate	292	231	251	233	254	304	NA	355	349	345	402
Total U.S.	First Prof.	21,278	23,235	24,416	24,082	23,884	23,649	23,074	22,093	20,468	19,350	18,831
	Graduate	2,287	2,273	2,499	2,482	2,651	2,776	2,791	2,942	2,961	2,928	3,051

* Full-time only
** No graduate program
NA = Not available

Source: Data are from the American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1973 through fall 1983, and Enrollment Report on Graduate Degree Programs in Pharmacy, fall 1973 through fall 1983. (Exact titles differ across years.)

Table 5

Change in Pharmacy Enrollments
in the WICHE States

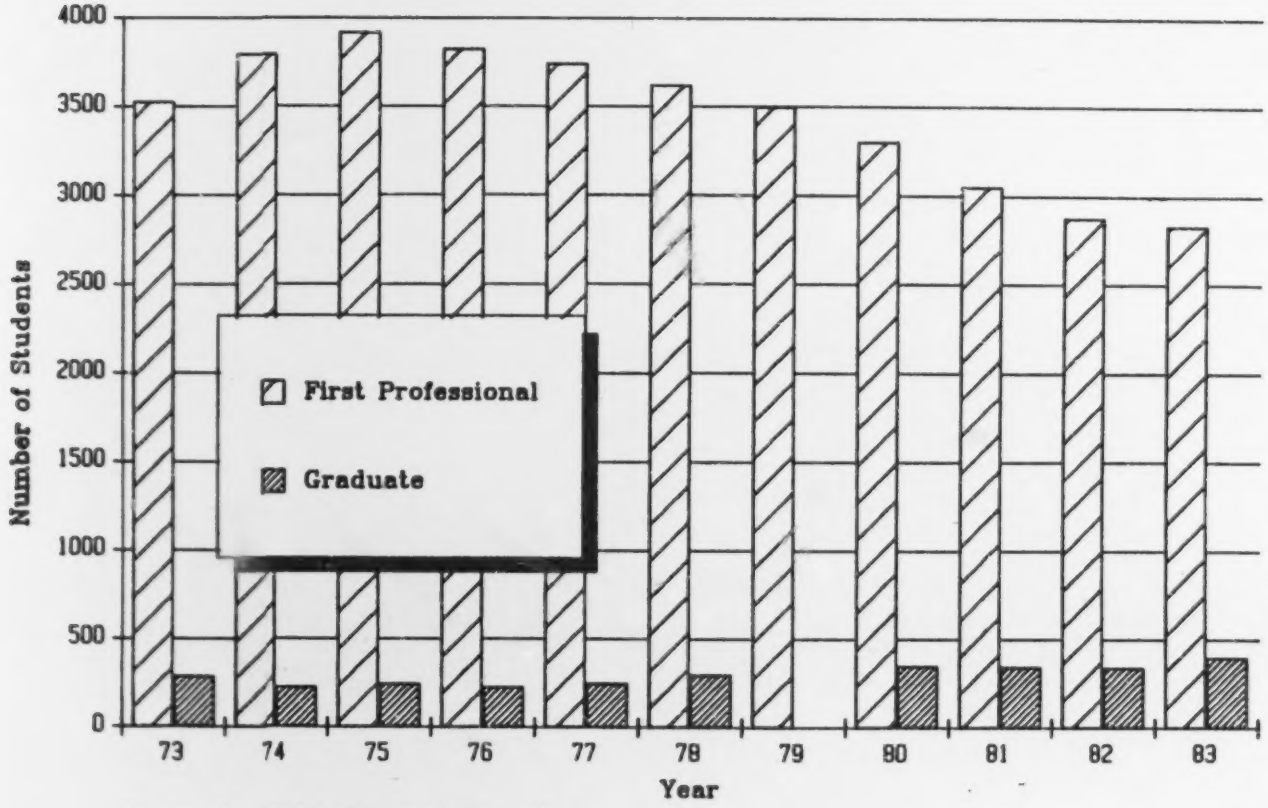
State	Level	Change 1973-74 to 1978-79		Change 1978-79 to 1983-84		Total Change 1973-74 to 1983-84	
		Number	Percent	Number	Percent	Number	Percent
Arizona	First Prof.	-92	-35.0	-7	-4.9	-99	-37.6
	Graduate	-6	-18.8	62	238.5	56	175.0
California	First Prof.	128	10.7	-120	-9.1	8	0.7
	Graduate	14	12.5	18	14.3	32	28.6
Colorado	First Prof.	36	22.9	-22	-11.4	14	8.9
	Graduate	1	9.1	6	50.0	7	63.6
Idaho	First Prof.	5	2.2	-148	-63.0	-143	-62.2
	Graduate	3	42.9	-5	-50.0	-2	-28.6
Montana	First Prof.	11	9.5	-31	-24.4	-20	-17.2
	Graduate	-1	-33.3	1	50.0	0	0.0
New Mexico*	First Prof.	29	20.7	-48	-28.4	-19	-13.8
North Dakota	First Prof.	-60	-16.0	-101	-32.1	-161	-42.9
	Graduate	-11	-39.3	-5	-29.4	-16	-57.1
Oregon	First Prof.	41	19.2	-62	-19.3	-21	-7.5
	Graduate	10	62.5	4	15.4	14	87.5
Utah	First Prof.	-12	-5.4	-80	-38.1	-92	-41.4
	Graduate	-2	-6.1	15	48.4	13	39.4
Washington	First Prof.	40	9.8	-127	-27.8	-87	-21.3
	Graduate	4	8.0	2	3.7	6	12.0
Wyoming*	First Prof.	-28	-19.3	-45	-38.5	-73	-50.3
WICHE Region	First Prof.	98	2.8	-791	-21.8	-693	-19.6
	Graduate	12	4.1	98	32.2	110	37.7
Total U.S.	First Prof.	2,371	11.1	-4,818	-20.4	-2,447	-11.5
	Graduate	489	21.4	275	9.9	764	33.4

*No graduate program.

Note: Percent changes may in some cases be misleading due to the small number of students involved. Thus, both numbers and percentages should be reviewed in analyzing this table.

Source: Data are from the American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1973 through fall 1983, and Enrollment Report on Graduate Degree Programs in Pharmacy, fall 1973 through fall 1983.

Figure 1
Enrollment in Pharmacy Programs in the WICHE Region



Notes: 1. Full-time students only
2. No graduate-level data were available for 1979

Source: Table 4

(this is graphically illustrated in Figure 1). Overall, regional enrollments in first professional pharmacy programs declined 19.6 percent between 1973-74 and 1983-84, and nine out of 11 WICHE states with first professional pharmacy programs experienced 10-year declines (Table 5). Altogether, 3,531 students were enrolled in first professional pharmacy programs in the WICHE states in 1973-74, in comparison to only 2,838 in 1983-84.

Figure 1 in Appendix E (pages 62-75) provides more detail on state variations in the first professional enrollment patterns delineated in Table 4. Pharmacy enrollments in some WICHE states have changed dramatically during the past decade, while enrollments in other states have remained fairly stable. Four states experienced slight increases in first professional enrollments in 1983-84; however, all WICHE states except California and Colorado showed a net decline in first professional enrollments between 1973-74 and 1983-84 (see Table 5).[1]

It should be noted that other health professions have also encountered problems in recent years in attracting students. Medical school enrollments, for example, dropped in 1984-85 for the first time in many years. A multitude of factors could affect decisions to apply to and enroll in pharmacy school, such as professional salaries and working conditions, perceptions of job availability, tuition, developments in other health professions, and the reputation of the profession and of individual schools of pharmacy.

According to the U.S. Department of Health and Human Services, the elimination of federal capitation support for pharmacy education and a decline in the size of the traditional college-age population (18-22 year-olds) are two primary factors underlying the decline in pharmacy enrollments. Two additional factors may have contributed to the decline in enrollments: (1) some pharmacy schools have cut back their program size in order to enhance program quality; and (2) some pharmacy schools have gone entirely to (or are moving toward) the six-year Pharm.D. degree in place of the baccalaureate degree in pharmacy. The effect of switching to the six-year degree on enrollments is unclear. Some experts argue that since the Pharm.D. degree takes longer to complete than the baccalaureate degree (with attendant greater cost), fewer students may enroll in those programs; others suggest that switching to the six-year program may have the opposite effect because it may enhance the stature of the pharmacy degree.

Graduate Level. Data compiled by the American Association of Colleges of Pharmacy demonstrate that graduate-level pharmacy enrollments in the nation as a whole increased between 1970-71 and 1983-84, except for small one-year declines in 1974-75, 1976-77, and 1982-83. As Tables 4 and 5 and Figure 1 show, graduate enrollments in the WICHE region followed a different pattern: graduate enrollments generally dropped between 1973-74 and 1976-77, rose more than 50 percent between 1976-77 and 1980-81, and then leveled off. Figures for 1983-84 show a sharp (16 percent) one-year increase. Overall, the region experienced a 37.7 percent net increase in graduate-level enrollments between 1973-74 and 1983-84: 292 students were enrolled in graduate-level pharmacy programs in 1973-74, compared with 402 in 1983-84. At the state level, all

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[1]New data reveal that first professional enrollments in five WICHE states increased in 1984-85. Three of the four states which experienced growth in 1983-84 showed declining or stable enrollments in 1984-85.

WICHE states except Idaho, Montana, and North Dakota showed a net increase in graduate-level pharmacy enrollments between 1973-74 and 1983-84, although the absolute changes (in terms of the numbers of students enrolled) were generally quite small (Table 5).

Enrollments By Sex

Table 6 traces the enrollment patterns of male and female first professional pharmacy students in the WICHE states between 1973-74 and 1983-84. As the table shows, males constituted the majority of pharmacy students in 1973-74 when 73 percent of the first professional pharmacy students in the WICHE region were male. State percentages ranged from 65 percent in Montana and Washington to 84 percent in Idaho and New Mexico. However, the participation of females in first professional pharmacy programs increased virtually every year between 1973-74 and 1983-84, when 51 percent of the students in first professional programs in the WICHE states were female. (Women constituted 52.6 percent of total enrollments nationwide in 1983-84.) The representation of females in pharmacy schools in individual WICHE states in 1983-84 ranged from a low of 36 percent in Idaho and New Mexico to a high of 58 percent in Arizona. The remaining states averaged between 42 and 55 percent female.

Minority Enrollments

Table 7 shows the extent to which Blacks, Hispanics, American Indians, and Asians participate in pharmacy education in the WICHE region. The figures in Table 7 show the numbers and percentages of pharmacy students in each WICHE state who are members of minority groups. These proportions can be directly compared to the proportions in Table 8, which show the extent to which four major minority groups were represented in the total population of each WICHE state in the 1980 census. A comparison of the minority representation in first professional pharmacy programs and the general population of the WICHE region is graphically illustrated in Figure 2.

Tables 7 and 8 and Figure 2 show that there are considerable disparities in the representation of minority groups in pharmacy programs in most WICHE states and the region as a whole compared with their representation in the general population. In New Mexico, for example, Hispanics constitute approximately 37 percent of the general population but only 20-23 percent of first professional pharmacy enrollments. Such disparities are not exclusive to pharmacy but exist in many professional programs.

As is true for the nation as a whole, Blacks, Hispanics, and American Indians are consistently underrepresented in both first professional and graduate-level pharmacy programs in the WICHE region (most graduate programs have virtually no minority enrollment). In contrast, Asians have been very well represented at the first professional level during most years.

Table 7 shows that total minority representation in first professional pharmacy programs in the WICHE region as a whole increased substantially between 1973-74 and 1983-84. Minorities constituted 27 percent of total first professional enrollments in 1983-84, compared with 13 percent in 1973-74. However, the large majority of these minority enrollments are Asians, who make

Table 6

Sex Distribution of First Professional Pharmacy Students
in the WICHE States
Number and Percent of Total Enrollment

State	Sex	1973-74 Number	1973-74 Percent	1983-84 Number	1983-84 Percent
Arizona	Male	205	78	69	42
	Female	58	22	95	58
California	Male	838	70	542	45
	Female	355	30	659	55
Colorado	Male	111	71	82	48
	Female	46	29	89	52
Idaho	Male	193	84	56	64
	Female	37	16	31	36
Montana	Male	75	65	47	49
	Female	41	35	49	51
New Mexico	Male	118	84	77	64
	Female	22	16	44	36
North Dakota	Male	284	76	116	54
	Female	91	24	98	46
Oregon	Male	198	70	130	50
	Female	83	30	130	50
Utah	Male	177	80	76	58
	Female	45	20	54	42
Washington	Male	267	65	144	45
	Female	142	35	178	55
Wyoming	Male	115	79	40	56
	Female	30	21	32	44
WICHE Region	Male	2,581	73	1,379	49
	Female	950	27	1,459	51

Note: Percentages do not always add to 100.0 due to rounding.

Source: Data are from the American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1973 and fall 1983.

Table 7

Minority Enrollment in Pharmacy Programs in the WICHE States— Number and Percent of Total Enrollment

State	Level & Group	1973-74 Number	1973-74 Percent	1983-84 Number	1983-84 Percent
Arizona	First Prof.				
	Black	0	0	1	*
	Hispanic	24	8	14	9
	Am. Indian	1	*	6	4
	Asian	10	3	9	5
	Graduate				
	Black	0	0	1	1
	Hispanic	0	0	2	2
	Am. Indian	0	0	2	2
	Asian	0	0	2	2
California	First Prof.				
	Black	16	1	33	3
	Hispanic	24	2	60	5
	Am. Indian	3	*	2	*
	Asian	218	18	517	43
	Graduate				
	Black	1	1	1	*
	Hispanic	3	3	1	*
	Am. Indian	0	0	0	0
	Asian	13	12	8	6
Colorado	First Prof.				
	Black	0	0	2	1
	Hispanic	5	3	8	4
	Am. Indian	0	0	2	1
	Asian	4	42	14	8
	Graduate				
	Black	0	0	0	0
	Hispanic	1	9	0	0
	Am. Indian	0	0	0	0
	Asian	0	0	0	0
Idaho	First Prof.				
	Black	0	0	1	1
	Hispanic	2	1	2	2
	Am. Indian	1	*	0	0
	Asian	33	14	4	5
	Graduate				
	Black	0	0	0	0
	Hispanic	0	0	0	0
	Am. Indian	0	0	0	0
	Asian	0	0	0	0
Montana	First Prof.				
	Black	1	1	0	0
	Hispanic	0	0	0	0
	Am. Indian	1	1	0	0
	Asian	0	0	1	1
	Graduate				
	Black	0	0	0	0
	Hispanic	0	0	0	0
	Am. Indian	0	0	0	0
	Asian	0	0	0	0
New Mexico**	First Prof.				
	Black	0	0	1	*
	Hispanic	29	20	28	23
	Am. Indian	1	1	2	2
	Asian	2	1	0	0
North Dakota	First Prof.				
	Black	0	0	0	0
	Hispanic	0	0	0	0
	Am. Indian	0	0	1	*
	Asian	0	0	1	*
	Graduate				
	Black	0	0	0	0
	Hispanic	0	0	0	0
	Am. Indian	0	0	0	0
	Asian	0	0	0	0
Oregon	First Prof.				
	Black	0	0	0	0
	Hispanic	1	*	0	0
	Am. Indian	1	*	0	0
	Asian	14	5	0	0
	Graduate				
	Black	0	0	0	0
	Hispanic	0	0	0	0
	Am. Indian	0	0	0	0
	Asian	1	*	0	0
Utah	First Prof.				
	Black	0	0	0	0
	Hispanic	5	2	2	2
	Am. Indian	0	0	0	0
	Asian	19	8	10	8
	Graduate				
	Black	0	0	0	0
	Hispanic	0	0	0	0
	Am. Indian	0	0	0	0
	Asian	2	*	1	2
Washington	First Prof.				
	Black	5	1	7	2
	Hispanic	1	*	11	3
	Am. Indian	1	*	2	*
	Asian	31	8	26	9
	Graduate				
	Black	0	0	0	0
	Hispanic	0	0	0	0
	Am. Indian	0	0	0	0
	Asian	1	2	3	5
Wyoming**	First Prof.				
	Black	0	0	0	0
	Hispanic	3	2	0	0
	Am. Indian	0	0	0	0
	Asian	1	1	1	1
WICHE Region	First Prof.				
	Black	22	1	45	2
	Hispanic	94	3	123	4
	Am. Indian	9	*	15	*
	Asian	332	9	585	21
	Graduate				
	Black	1	*	2	*
	Hispanic	4	1	3	1
	Am. Indian	0	0	2	*
	Asian	17	6	14	4

* Less than 1 percent
** No graduate program

Source: Data are from the American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1973 and fall 1983, and Enrollment Report on Graduate Degree Programs in Pharmacy, fall 1973 and fall 1983.

Table 8

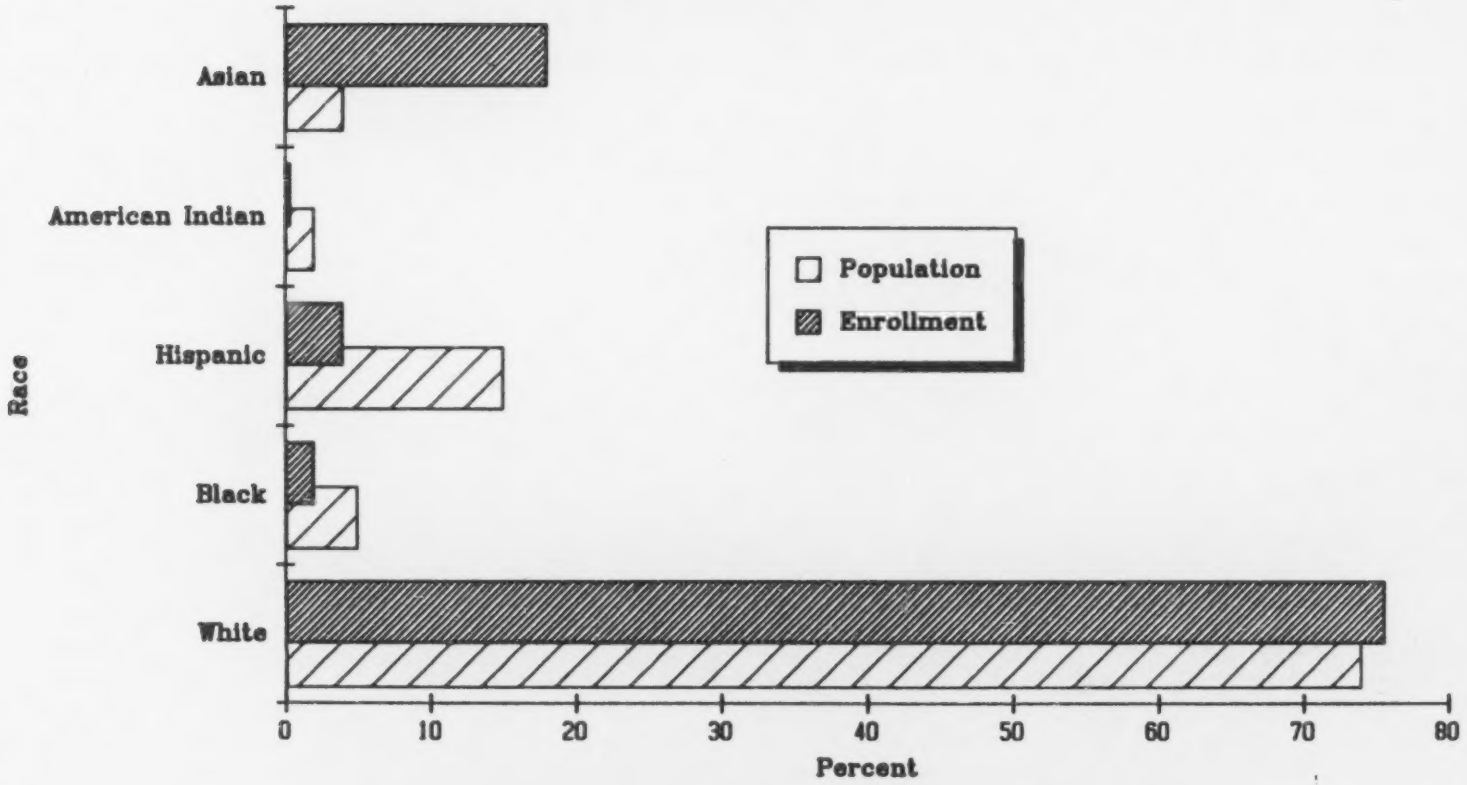
Major Minority Groups in the WICHE States, 1980*

State	Total Population	Black Non-Hispanic Number	Black Non-Hispanic Percent	Hispanic Number	Hispanic Percent	American Indian Number	American Indian Percent	Asian Number	Asian Percent
Arizona	2,718,215	73,245	3	440,701	16	152,745	6	22,032	1
California	23,667,902	1,783,810	8	4,544,331	19	201,369	1	1,253,818	5
Colorado	2,889,964	99,884	3	339,717	12	18,068	1	29,916	1
Idaho	943,935	2,666	**	36,615	4	10,521	1	5,948	1
Montana	786,690	1,713	**	9,974	1	37,270	5	2,503	**
New Mexico	1,302,894	23,154	2	477,222	37	106,119	8	6,825	**
North Dakota	652,717	2,535	**	3,902	**	20,158	3	1,979	**
Oregon	2,633,105	36,522	1	65,847	2	27,314	1	34,775	1
Utah	1,461,037	8,980	1	60,302	4	19,256	1	15,076	1
Washington	4,132,156	103,999	2	120,016	3	60,804	1	102,537	2
Wyoming	469,557	3,284	1	24,499	5	7,094	2	1,969	**
WICHE Region	41,658,172	2,139,792	5	6,123,126	15	660,718	2	1,477,368	4

*Only those WICHE states with pharmacy programs.
**Less than 1 percent.

Source: 1980 U.S. Census.

Figure 2
Percentage of Minorities in First Professional Pharmacy Programs and the General Population, WICHE Region, 1980



Source: Table 8 and American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1980.

up only 4 percent of the 1980 population in the region. In contrast, minorities constituted only 5 percent of total graduate enrollments in 1983-84, compared with 7 percent in 1973-74.

Pharmacy Degrees Conferred in the WICHE States

Table 9 presents data on the number of pharmacy degrees conferred in the WICHE states between 1972-73 and 1982-83, and Table 10 shows the percent change in pharmacy degrees conferred during that period of time. These data are presented graphically in Figure 3. Discussions of degree production at the first professional and graduate levels are treated separately below.

First Professional Level. The number of first professional degrees conferred nationwide peaked in 1976-77 and decreased in five of the next six years. Table 9 and Figure 3 show that trends in first professional degree production in the WICHE region between 1972-73 and 1982-83 generally paralleled those for the nation as a whole. The number of first professional degrees conferred in the WICHE region has shown a steady decline since 1976-77, after increasing every year between 1972-73 and 1976-77. However, the total number of first professional degrees conferred increased from 914 in 1972-73 to 948 in 1982-83, a net 10-year increase of 3.7 percent (Table 10). Existing enrollments suggest that the number of degrees conferred, which declined sharply after 1980-81, will continue to decrease at least through 1985-86.

Figure 3 in Appendix E (pages 62-75) graphically illustrates trends in first professional degree production in the individual WICHE states. In conjunction with Tables 9 and 10, these figures show that between 1972-73 and 1982-83, first professional degree production fluctuated considerably in most states. All states showed a net increase in the number of first professional pharmacy degrees conferred between 1972-73 and 1977-78. Degree production peaked later in a few states, but in all states except Colorado, Montana, and New Mexico there was a net decline between 1977-78 and 1982-83.2

Graduate Level. For the region as a whole, the number of graduate-level pharmacy degrees conferred showed a net decrease between 1972-73 and 1977-78 and a net increase between 1977-78 and 1982-83 (Table 10 and Figure 3). Overall, the region showed a 5.3 percent net increase between 1972-73 and 1982-83.

Geographical Origin of Students Enrolled in Pharmacy Programs in the WICHE States

Tables 11 and 12 and Figures 4 and 5 present data concerning the geographical origin of students enrolled in pharmacy programs in the WICHE states. As those data suggest, the WICHE region trains more pharmacy students

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[2]New data reveal that four WICHE states (California, Oregon, Washington, and Wyoming) experienced slight increases in the number of degrees conferred in 1983-84, although the number of degrees granted in the region as a whole continued to decline.

Table 9

Pharmacy Degrees Conferred in the WICHE States

State	Level	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
Arizona	First Prof.	67	60	89	62	77	75	66	51	46	47	43
	Graduate	3	1	2	6	4	2	9	2	5	5	29
California	First Prof.	364	356	358	391	421	396	416	NA	425	367	389
	Graduate	49	58	59	6	60	22	24	NA	56	37	16
Colorado	First Prof.	34	36	60	52	50	54	51	65	62	66	64
	Graduate	3	1	5	6	2	1	3	0	2	4	5
Idaho	First Prof.	41	53	77	71	87	81	69	75	69	54	39
	Graduate	0	0	1	0	1	1	1	5	1	0	2
Montana	First Prof.	21	23	26	42	41	32	38	39	39	30	36
	Graduate	0	1	1	0	0	0	1	0	0	0	0
New Mexico*	First Prof.	32	44	53	50	63	47	61	58	52	56	47
North Dakota	First Prof.	84	94	111	124	129	117	109	93	75	57	72
	Graduate	5	12	9	6	6	8	6	7	6	4	5
Oregon	First Prof.	76	81	73	85	97	103	93	40	66	93	64
	Graduate	2	7	2	0	2	2	4	2	8	5	10
Utah	First Prof.	63	65	71	80	64	70	69	74	68	51	54
	Graduate	2	6	5	3	8	3	12	16	15	9	8
Washington	First Prof.	102	108	131	133	140	145	140	145	129	118	112
	Graduate	11	7	11	12	5	6	8	9	13	8	4
Wyoming*	First Prof.	30	29	38	49	75	75	40	45	41	41	28
WICHE Region	First Prof.	914	949	1,087	1,139	1,244	1,195	1,152	NA	1,072	980	948
	Graduate	75	93	95	39	88	45	68	NA	106	72	79
Total U.S.	First Prof.	5,301	6,097	6,848	7,883	8,200	7,982	7,746	7,458	7,572	7,039	6,645
	Graduate	513	504	528	572	565	600	588	639	614	640	634

* No graduate program

NA = Not available. University of Southern California totals not available for 1979-80.

Source: Data are from the American Association of Colleges of Pharmacy, Degrees Conferred by Schools and Colleges of Pharmacy, Academic Years 1972-73 through 1982-83.

Table 10

Change in Pharmacy Degrees Conferred
in the WICHE States

State	Level	Change 1972-73 to 1977-78		Change 1977-78 to 1982-83		Total Change 1972-73 to 1982-83	
		Number	Percent	Number	Percent	Number	Percent
Arizona	First Prof.	8	11.9	-32	-42.7	-24	-35.8
	Graduate	-1	-33.3	27	350.0	26	866.7
California	First Prof.	32	8.8	-7	-1.8	25	6.9
	Graduate	NA	NA	NA	NA	-33	-67.3
Colorado	First Prof.	20	58.8	10	18.6	30	88.2
	Graduate	-2	-66.7	4	400.0	2	66.7
Idaho	First Prof.	40	97.6	-42	-51.9	-2	-4.9
	Graduate	1	NA	1	100.0	2	NA
Montana	First Prof.	11	52.4	4	12.5	15	71.4
	Graduate	0	NA	0	NA	0	NA
New Mexico*	First Prof.	15	46.9	0	0.0	15	46.9
North Dakota	First Prof.	33	39.3	-45	-38.5	-12	-14.3
	Graduate	3	60.0	-3	-37.5	0	0.0
Oregon	First Prof.	27	35.5	-39	-37.9	-12	-15.8
	Graduate	0	0.0	8	400.0	8	400.0
Utah	First Prof.	7	11.1	-16	-22.9	-9	-14.3
	Graduate	1	50.0	5	166.7	6	300.0
Washington	First Prof.	43	42.2	-33	-22.8	10	9.8
	Graduate	-5	-45.5	-2	-66.7	-7	-63.6
Wyoming*	First Prof.	45	150.0	-47	-62.7	-2	-6.7
WICHE Region	First Prof.	281	30.7	-247	-20.7	34	3.7
	Graduate	-30	-40.0	34	75.6	4	5.3
Total U.S.	First Prof.	2,681	50.6	-1,337	-16.8	1,344	25.4
	Graduate	87	17.0	34	5.7	121	23.6

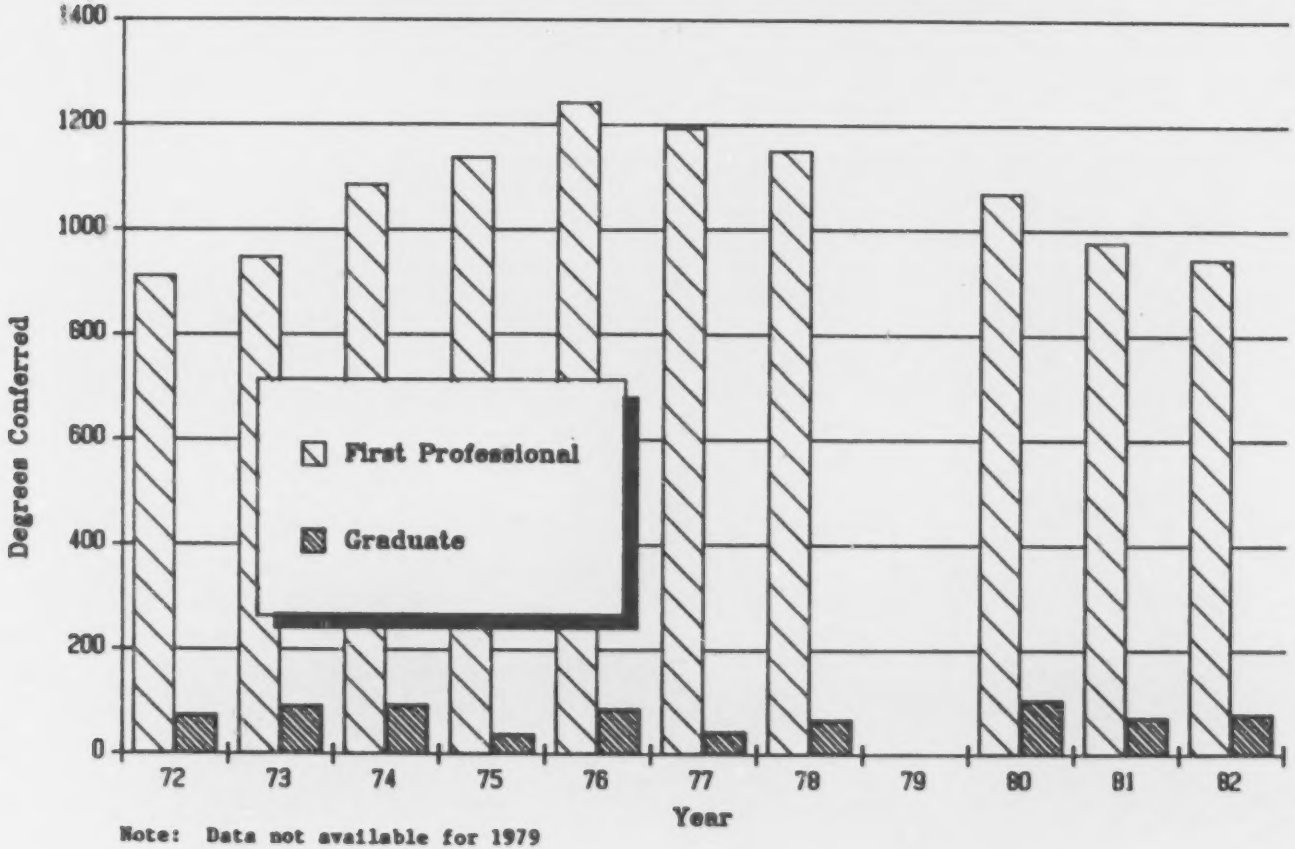
* No graduate program

NA = Not available—Idaho State University had no graduate enrollment in 1972-73, and the University of Montana had none in 1972-73, 1977-78, and 1982-83.

Note: While percent changes are very large in some cases, actual changes in the number of degrees conferred are quite small. Thus, both numbers and percentages should be reviewed in analyzing this table.

Source: Data are from the American Association of Colleges of Pharmacy, Degrees Conferred by Schools and Colleges of Pharmacy, Academic Years 1972-73 through 1982-83.

Figure 3
Pharmacy Degrees Conferred in the WICHE Region



Note: Data not available for 1979

Source: Table 9

than originate here, i.e., the region experiences a net inflow of students from other states.

Trends in the geographical origin of first professional and graduate-level pharmacy students are discussed separately below.

First Professional Level. Table 11 shows the percentage of pharmacy students from each WICHE state who are enrolled in programs in their home states. First professional pharmacy students tend to receive their training close to home: approximately 90 percent of the first professional pharmacy students from the WICHE region enroll in programs in their home states.

Table 12 shows the percentage of students enrolled in pharmacy programs in each WICHE state who are in-state residents, as well as the percentages who are from other WICHE states, non-WICHE states, and foreign countries. Approximately 80 percent of the first professional pharmacy students in the WICHE region as a whole are in-state residents, and the majority of students in all individual states except Idaho, North Dakota, and Wyoming are in-state residents. In contrast, only 38 percent of Wyoming's first professional pharmacy students in 1982-83 were in-state residents.

Approximately 10 percent of the first professional pharmacy students enrolled in programs in the WICHE states are from other WICHE states. However, these percentages vary considerably across states. Less than 5 percent of the first professional pharmacy students in Arizona, California, and Colorado in 1982-83 were from other WICHE states, in comparison to 35 percent of the first professional pharmacy students in Idaho.

Table 12 shows that approximately 5 percent of the first professional pharmacy students in the region as a whole are from non-WICHE states, and less than 6 percent are foreign. Less than 20 percent of the first professional pharmacy students in most individual states are from non-WICHE states, and less than 10 percent are foreign. However, over 30 percent of the first professional students in Wyoming are from non-WICHE states.

Figure 4 summarizes the data presented in Table 12 for first professional pharmacy students in the WICHE region as a whole. Specifically, it shows the geographical origin of students enrolled in first professional pharmacy programs in the WICHE region between 1973-74 and 1982-83. As the figure shows, the proportions of out-of-state students have decreased slightly over time for the region as a whole, and the proportion of in-state students has increased.

Graduate Level. Graduate-level pharmacy students are more likely to attend school out of state than first professional students (Table 11).[3] Similarly, graduate-level pharmacy programs have disproportionately smaller in-state enrollments than first professional programs. As Table 12 shows, fewer than one-half of the students enrolled in graduate-level pharmacy programs in the WICHE region are in-state residents, although the percentage

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[3]This is due, in part, to institutions' restrictions on keeping their own students for graduate study.

Table 11

Percentage of Pharmacy Students from the WICHE States Enrolled in Programs in their Home States, 1982-83*

State	Level	Percent
Arizona	First Prof.	93
	Graduate	91
California	First Prof.	88
	Graduate	69
Colorado	First Prof.	89
	Graduate	78
Idaho	First Prof.	92
	Graduate	38
Montana	First Prof.	92
	Graduate	00
New Mexico**	First Prof.	89
North Dakota	First Prof.	94
	Graduate	60
Oregon	First Prof.	95
	Graduate	50
Utah	First Prof.	96
	Graduate	75
Washington	First Prof.	97
	Graduate	73
Wyoming**	First Prof.	91
WICHE Region***	First Prof.	91
	Graduate	67

*Proportion of all who could be enrolled in their home state, i.e., their home state had a pharmacy program

**No graduate program

***North Dakota not included because it did not become a participant in WICHE until 1985.

Source: Data are from the American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1982 and Enrollment Report on Graduate Degree Programs in Pharmacy, fall 1982.

Table 12

Origin of Pharmacy Students Enrolled in Programs in the WICHE States

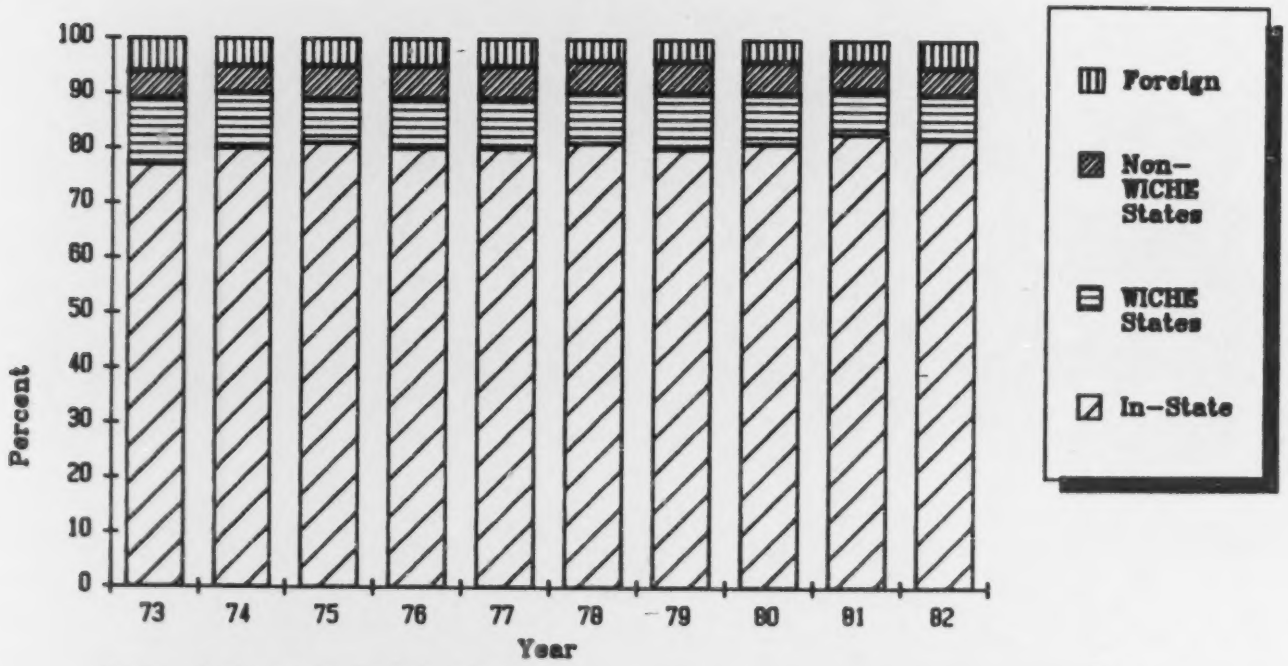
State	Level	1973-74 In-State	1973-74 Other WICHE States	1973-74 Non-WICHE States***	1973-74 Foreign (Excluding Canada)	1982-83 In-State	1982-83 Other WICHE States	1982-83 Non-WICHE States***	1982-83 Foreign (Excluding Canada)
Arizona	First-Prof.	63%	25%	8%	4%	93%	4%	2%	0%
	Graduate	31	28	34	6	57	11	24	8
California	First-Prof.	88	3	3	6	90	4	2	4
	Graduate	35	7	29	29	47	2	14	36
Colorado	First-Prof.	82	4	9	4	85	4	9	2
	Graduate	36	18	27	18	90	0	0	10
Idaho	First-Prof.	40	45	4	11	46	35	8	11
	Graduate	43	0	0	57	63	0	25	13
Montana	First-Prof.	85	3	10	1	62	10	18	9
	Graduate	0	0	0	100	0	0	0	100
New Mexico*	First-Prof.	96	1	2	1	70	8	14	7
North Dakota	First-Prof.	62	2	33	2	47	****	48	4
	Graduate	61	4	18	18	30	0	20	50
Oregon	First-Prof.	79	11	1	9	70	18	2	9
	Graduate	56	12	19	13	21	17	21	41
Utah	First-Prof.	59	33	5	3	75	14	2	8
	Graduate	30	24	18	27	38	10	52	0
Washington	First-Prof.	86	6	2	6	88	6	3	3
	Graduate	44	22	16	18	33	27	19	21
Wyoming*	First-Prof.	50	11	32	7	38	18	33	11
WICHE Region**	First-Prof.	77	12	5	6	82	8	5	5
	Graduate	37	15	24	24	46	10	19	25

* No graduate program.
** North Dakota not included because it did not become a participant in WICHE until 1985.
*** Other states and Canada.
**** Less than 1 percent.

Note: Rows within years do not always sum to 100 percent due to rounding.

Source: Data are from the American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1973 and fall 1982, Enrollment Report on Graduate Degree Programs in Pharmacy, fall 1973 and fall 1982, and A Study of the Geographical Distribution of Undergraduate Pharmacy Students, 1973-74.

Figure 4
Origin of First Professional Pharmacy Students in the WICHE Region



Note: North Dakota not included

Source: American Association of Colleges of Pharmacy, Enrollment Report on Professional Degree Programs in Pharmacy, fall 1973 through fall 1982, and A Study of the Geographical Distribution of Undergraduate Pharmacy Students, 1973-74.

of in-state students varies considerably across states. None of the graduate-level pharmacy students in Montana in 1982-83 were in-state residents, in comparison to 90 percent of the graduate students in Colorado.

Figure 5 illustrates the geographical origin of graduate-level pharmacy students in the WICHE region as a whole between 1973-74 and 1982-83. As the figure shows, the largest group of graduate-level pharmacy students in the region are in-state residents. Foreign students generally represent the second largest group of students, followed by students from non-WICHE states. Students from other WICHE states generally constitute the smallest group of graduate-level pharmacy students in the WICHE states.

Conclusion

The information in this chapter reveals a number of interesting trends in the training of pharmacists in the WICHE states. Educators and state policymakers should be cognizant of these trends, since they may not be consistent with the region's long-term pharmacy manpower needs.

- Between 1975-76 and 1983-84, first professional pharmacy enrollments suffered a sharp and steady decline, both nationally and in the WICHE region. Graduate-level enrollments generally increased in the late 1970s (largely because of growing enrollments of foreign and nonresident students) and then leveled off. Graduate enrollments showed a sharp increase in 1983-84.

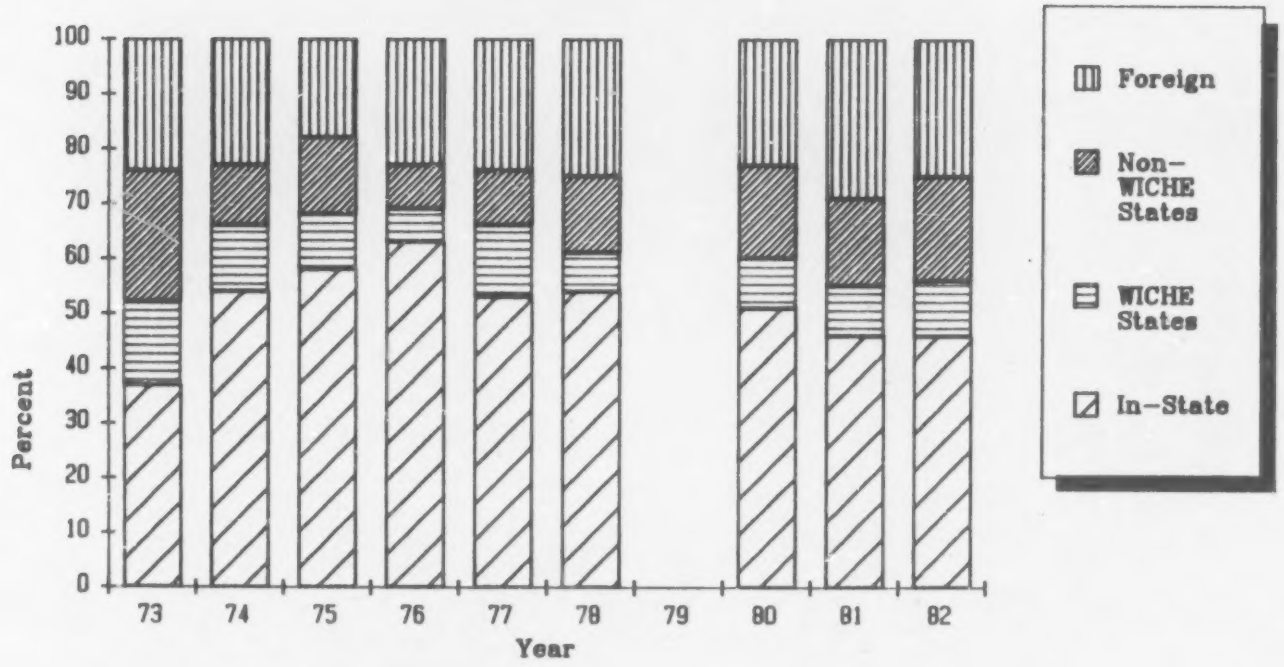
- Both nationally and in the WICHE region, Blacks, Hispanics, and American Indians are underrepresented in pharmacy programs at both the first professional and graduate levels, and Asians are generally well represented, especially at the first professional level. Females were underrepresented in the early 1970s, but their representation increased steadily throughout the decade and they constituted 51 percent of all first professional enrollments in the region in 1983-84 (52.6 percent nationally).

- The most critical element to consider in analyzing the relationship of pharmacist supply to demand is the number of first professional degrees conferred. As this chapter has shown, the number of first professional pharmacy degrees conferred nationally and in the WICHE region steadily decreased between 1976-77 and 1982-83. Graduate-level degree production fluctuated considerably, but the region showed a slight net increase between 1972-73 and 1982-83 in the number of graduate degrees conferred. These trends raise questions about the relationship between program output and long-term needs.

- Approximately 90 percent of the first professional pharmacy students from the WICHE states enroll in programs in their home states. Considerably fewer graduate-level pharmacy students enroll in programs in their home states.

- In-state residents constitute the bulk of enrollments in both first professional and graduate-level programs in the WICHE states. At the first professional level, students from other WICHE states represent the second largest group of students, followed by students from

Figure 5
Origin of Graduate-Level Pharmacy Students in the WICHE Region



Notes: 1. North Dakota not included
2. No data were available for 1979

Source: American Association of Colleges of Pharmacy, Enrollment Report on Graduate Degree Programs in Pharmacy, fall 1973 through fall 1982.

non-WICHE states and foreign students. In contrast, foreign students are the second largest group of students at the graduate level, and students from other WICHE states are the smallest. Interestingly, first professional programs have tended to serve relatively greater proportions of in-state students over time, while graduate programs have tended to serve relatively greater proportions of foreign students and students from non-WICHE states.

These findings raise questions about the adequacy of opportunities for pharmacy training in the region, and the degree of encouragement provided to regional residents to undertake the study of pharmacy.

2. PROJECTED SUPPLY OF NEW PHARMACY GRADUATES IN THE WICHE STATES

Few data are available concerning the future production of licensed pharmacists. Moreover, the literature makes virtually no attempt to project graduate-level enrollments or degree production, nor does it attempt to make regional breakdowns. Nevertheless, some data are available that permit tentative conclusions to be drawn about the training of pharmacists at the first professional level in the United States and WICHE region through the year 2000.

National Supply Projections

Many factors may go into the decision to enroll in pharmacy school (career preference, tuition, salaries, professional reputation, perceived job availability, developments in other health professions, etc.). The absence of reliable data on these variables makes it difficult to predict the future supply of pharmacy graduates with accuracy. However, past trends in the production of new pharmacy graduates provide some indication of what might be expected to occur in the next several years.

As noted in Chapter 1, first professional pharmacy enrollments have shown a continual decline in the nation as a whole since 1975. The U.S. Department of Health and Human Services projects that, nationwide, first professional pharmacy enrollments will continue to decline through 1991 and then stabilize through the yar 2000.[1] Similarly, the number of first professional pharmacy degrees conferred is expected to decline through 1993 and then stabilize. Table 13 presents national projections of pharmacy enrollments and degrees conferred for the years 1980 to 2000.

As Table 13 shows, enrollments in the third-to-last year of pharmacy programs are projected to decline 14.8 percent nationally between 1980 and 1985. They are projected to decline another 9.9 percent between 1985 and 1990, but only 1.0 percent between 1990 and 2000. Similarly, the number of first professional degrees conferred nationwide is expected to decline 13.0 percent between 1980 and 1985, 14.8 percent between 1985 and 1990, and 2.5 percent between 1990 and 1999. (Attrition accounts for the fact that the total projected decline in degrees conferred--30.3 percent--is greater than the total projected decline in enrollments—25.7 percent.) Thus, the rate of decline in both enrollments and degrees conferred is projected to gradually decrease throughout the 1980s and 1990s.

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[1]National projections are taken from the Third Report to the President and Congress on the Status of Health Professions Personnel in the United States, published in 1982 by the U.S. Department of Health and Human Services. The Department of Health and Human Services bases its judgment that enrollments will stabilize in 1991 on an extrapolation of the slowing rate of decline in enrollments over the past few years.

Table 13

Projected Pharmacy Enrollments and Supply of New Pharmacy Graduates at the First Professional Level—United States, 1980 to 2000

Year	Third-to-Last Year Enrollment	Percent Change	Number of Graduates	Percent Change
1980	8,035	—	7,070	—
1985	6,849	-14.8	6,148	-13.0
1990	6,168	- 9.9	5,240	-14.8
1995	6,106	- 1.0	5,110	- 2.5
2000	6,106	0	5,110	0

Source: U.S. Department of Health and Human Services, Third Report to the President and Congress on the Status of Health Professions Personnel in the United States, 1982.

The national projections performed by the U.S. Department of Health and Human Services reflect an extrapolation of the slowing rate of decline in the number of first professional pharmacy degrees conferred nationwide in recent years. The projections also reflect a projected decline in the 18-22 year-old population nationwide and take into account the conversion to a six-year Pharm.D. program in several schools. Finally, the projections assume that the percentage of women in schools of pharmacy will level off at 46 percent, and that the average completion rate by sex in schools of pharmacy will continue at its current level.

Models for Projecting the Supply of New Pharmacy Graduates in the WICHE Region

Trends in the WICHE region between 1972-73 and 1982-83 generally paralleled those of the nation as a whole in terms of both enrollments and degree production, so it is not likely that the region will deviate significantly from national trends through the year 2000 (although individual states may deviate somewhat from the national average). Table 14 and Figure 6 present projections of the annual supply of new pharmacy graduates in the WICHE states through the year 2000 based on the following two projection methods.[2] The projections are for first professional degrees only, since practicing pharmacists are required to have first professional degrees and many pharmacists with graduate degrees go into teaching or research.

Alternative 1: In recognition of the possibility that enrollments may stablize sooner than expected, the first alternative assumes that the future annual production of new pharmacy graduates in the region will remain at its 1983 level. Therefore, the figures shown in Table 9 concerning the number of first professional pharmacy degrees conferred in each WICHE state in 1982-83 were simply carried forward to Table 14 (under Alternative 1). Given the generally downward trend in enrollments, this is the most optimistic estimate of future supply.

Alternative 2: The second alternative utilizes the U.S. Department of Health and Human Services' national projections of future supply. Specifically, a five-year average (1979-1983) was taken of the percentage each WICHE state represents of all first professional pharmacy degrees conferred in the United States (from Table 9). These percentages were then applied to national projections of the supply of new pharmacy graduates through the year 2000 presented in the Third Report to the President and Congress on the Status of Health Professions Personnel in the United States (see Table 13). For

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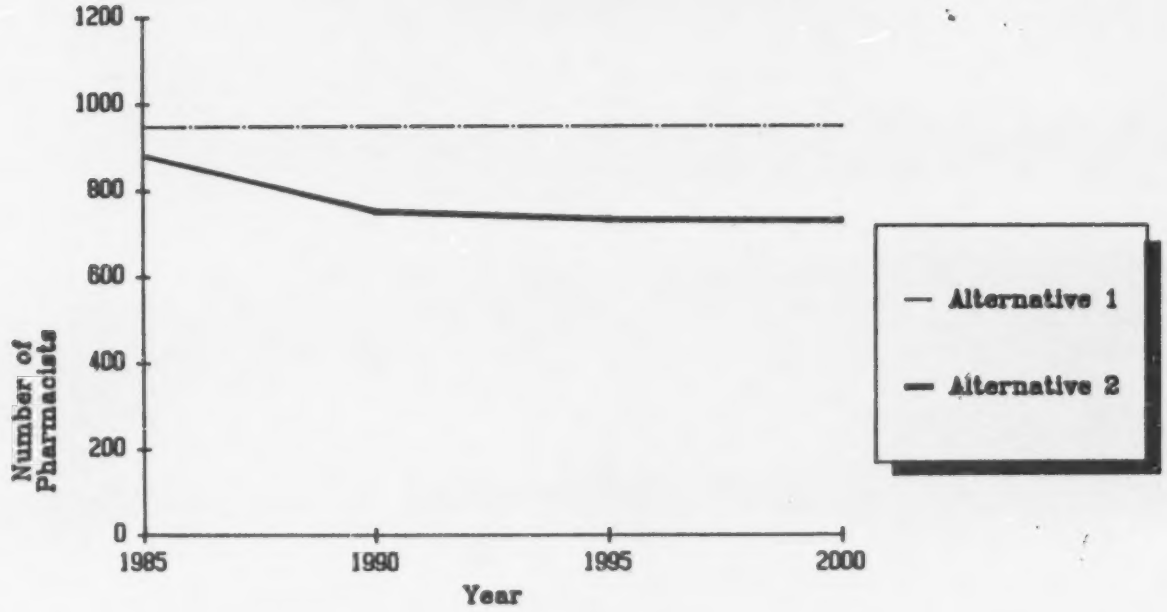
[2]There are a number of other methods that could be used to project the future supply of new pharmacy graduates. One possibility is a simple linear projection of recent trends. We did not use this method because some pharmacy educators feel that it does not sufficiently recognize recent developments in pharmacy education and manpower utilization that may alter past trends. In fact, some educators feel that the decline in enrollments will reverse in the near future as demand increases relative to supply (enrollments did increase in five WICHE states in 1984-85). While this forecast may prove accurate, recent increases in a few states do not provide sufficient data for projecting long-term trends.

Table 14
Projected Annual Supply of New Pharmacy Graduates
in the WICHE States, 1985 to 2000

State	1985		1990		1995		2000	
	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
Arizona	43	42	43	36	43	35	43	35
California	389	339	389	289	389	282	389	282
Colorado	64	52	64	44	64	43	64	43
Idaho	39	51	39	44	39	42	39	42
Montana	36	31	36	26	36	25	36	25
New Mexico	47	46	47	39	47	38	47	38
North Dakota	72	68	72	58	72	57	72	57
Oregon	64	60	64	51	64	50	64	50
Utah	54	53	54	45	54	44	54	44
Washington	112	108	112	92	112	90	112	90
Wyoming	28	33	28	28	28	27	28	27
WICHE Region	948	879	948	750	948	731	948	731

Note: The regional totals in this table and all subsequent projection tables and figures are not the sum of state totals. Separate regional projections were performed to avoid the effect of compounding any measurement error existing at the state level.

Figure 6
Projected Annual Supply of New Pharmacy Graduates in the WICHE Region, 1985-2000



Source: Table 14

example, if a state averaged 5 percent of all pharmacy degrees conferred in the United States between 1979 and 1983, then the state was also assumed to represent 5 percent of the projected degrees in 1985, 1990, 1995, and 2000.

Since the U.S. Department of Health and Human Services is recognized as an authority on pharmacist supply and demand, the discussion that follows is based on Alternative 2--the lower estimate of the future supply of new pharmacy graduates. Both alternatives should be reviewed, however, in light of circumstances within particular states. The projections do not represent precise estimates of future supply. Rather, they indicate the future implications of recent trends.

Projected Supply of New Pharmacy Graduates in the WICHE States

According to Alternative 2 in Table 14 and Figure 6, the annual supply of new pharmacy graduates in the WICHE region is projected to decline through 1995 and then stabilize.[3] In 1985, approximately 875 new pharmacists will graduate with first professional degrees from pharmacy schools in the WICHE region. This number will drop to approximately 750 in 1990 and 725 in 1995, a total decline of around 17 percent by the end of the decade. The greatest decline will occur between 1985 and 1990.

Projected supply trends at the state level follow much the same pattern as trends for the region as a whole (Table 14). Alternative 2 shows that if current trends continue, all WICHE states will show a decline in the annual production of new pharmacy graduates through 1995, when production is expected to stabilize.

Total Supply of New Pharmacists

New pharmacy graduates are not the only source of new pharmacists at the state or regional level. As they assess the adequacy of pharmacy education programs in meeting manpower demand, policymakers should recognize that a state's total pharmacist supply is augmented by two additional sources of new pharmacists: (1) in-migrating pharmacists from other states; and (2) inactive pharmacists reentering the labor market (for example, women who have temporarily dropped out of the labor market to raise children).

Few hard data concerning these two components of supply are available, which makes it difficult to provide numerical estimates of the extent to which they may augment supply. Inactive pharmacists reentering the labor market are assumed to contribute only minimally to total supply, although the numbers will probably increase as the proportion of women in the profession grows. In contrast, the contribution of in-migrating pharmacists to total supply is assumed to vary considerably across states. In some parts of the country the states' pharmacy programs produce sufficient (or more than sufficient) new pharmacy graduates to meet their own needs, which means that in-migrating

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[3]The production of new pharmacy graduates may stabilize sooner than expected in some WICHE states. Degree data for 1982-83 and 1983-84 show that production has fluctuated considerably in a few states, but it is too soon to tell whether recent increases signal a growth trend.

pharmacists probably do not contribute substantially to total supply in those states. Other states have no pharmacy programs or have programs that produce very few graduates relative to the demand for new pharmacists, which means that those states rely heavily on in-migrating pharmacists to maintain a balance of supply and demand. Data collected from a 2.5 percent sample of the 1980 U.S. census suggest that the western states import approximately 46 percent of their new pharmacists from other states.[4] This issue is discussed in more detail in Chapter 4.

Other Factors Affecting Actual Supply

The actual supply of new pharmacists may be affected by several additional factors which are difficult or impossible to quantify. For example, the proportion of women enrolled in pharmacy programs in the WICHE states is expected to increase for the next several years. Studies have shown that many women practice pharmacy at less than a full-time rate, and the professional career of female pharmacists is estimated to be approximately seven-tenths that of male pharmacists.[5] However, many inactive female pharmacists may reenter the work force at some point after engaging in child-rearing responsibilities. Although recent studies show that the career patterns of relatively young female pharmacists more closely resemble those of men, the actual supply of full-time pharmacists may be diminished by the increasing participation of women in the profession.

Another factor which may diminish the actual supply of new pharmacists is that not all graduates with first professional degrees go into practice immediately upon receiving their degrees. Moreover, these supply projections do not take into account the fact that some recent graduates are likely to migrate out of the states in which they receive their degrees.[6] Chapter 1 showed that almost 20 percent of the first professional pharmacy students in the WICHE states are out-of-state students, and it is likely that some of these students will return to their home states after they graduate. The Washington Council for Postsecondary Education has estimated that only 70 percent of the pharmacy graduates from postsecondary institutions in Washington state actually become licensed and active in that state.[7]

Interstate migration also means that the actual supply of new pharmacists in each state may be augmented by residents who attend pharmacy schools outside their home states and subsequently return to their home states to

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[4]U.S. Bureau of the Census, 1980, Public Use Microdata Sample, File A. Analysis performed by Applied Population Laboratory, University of Wisconsin-Madison.

[5]U.S. Department of Health and Human Services, Third Report to the President and Congress on the Status of Health Professions Personnel in the United States, 1982. Also Stanley Harmen, "Pharmacy Manpower: Oversupply...or Shortage?," American Druggist, February 1981.

[6]Out-migration of new graduates does not affect supply at the regional level as long as the new graduates remain within the region.

[7]Washington Council for Postsecondary Education, Pharmacy Education in the State of Washington. Final Report, June 1981.

practice. (These graduates would not be included in our state estimates of supply.) Chapter 1 showed that as many as 10 percent of the students from some WICHE states attend pharmacy programs outside their home states.

Other factors that may cause actual supplies to differ somewhat from our projected figures include:

- The percentage of active pharmacists who work part-time. The U.S. Department of Labor estimates that, at present, approximately 11 percent of pharmacists are employed part-time;
- The level of financial support provided by federal, state, and local governments for pharmacy education (including student aid, capitation funding, support for pharmacy research, etc.);
- The college enrollment rates of 18-22 year-olds, who are expected to decline in numbers throughout the decade;
- Continuation of the trend toward requiring a minimum of six years of training (with attendant additional cost) to obtain the first professional degree; and,
- The degree of emphasis on clinical training in Doctor of Pharmacy programs, in which enrollments are limited by the size of facilities for clinical instruction.

Uncertainties in these areas will affect the projected decline in the number of new pharmacy graduates. Moreover, it should be emphasized that these projections of pharmacy graduates in the WICHE region represent only one component of the supply side of the manpower equation. Projecting manpower supply is an inexact science, and these qualifications should be kept in mind when using this report in long-range planning efforts.

3. PROJECTED DEMAND FOR NEW PHARMACISTS IN THE WICHE STATES

The U.S. Department of Health and Human Services estimates that the total number of positions for pharmacists will increase 28 percent nationally between 1980 and 2000. The U.S. Department of Labor estimates that total pharmacist employment will increase 27.2 percent, from 151,000 in 1982 to 192,100 in 1995. While total demand for pharmacists is an important factor to consider, pharmacy education programs are most concerned with the annual demand for new or additional pharmacists—job openings that may be filled by new pharmacy graduates each year. This chapter presents several alternative projections of the annual demand for new or additional pharmacists in the WICHE states between 1985 and 2000.1

Components of the Demand for Additional Pharmacists

Estimates of the annual demand for new or additional pharmacists have two components: job openings due to replacement and job openings due to growth. Each of these components is discussed separately below.

Replacement. Replacement simply refers to the need to replace those practicing pharmacists who leave the profession each year. Annual replacement rates are based on three factors: separations, occupational outmobility, and geographical outmobility.

Separations refer to persons who leave the work force due to death or retirement. Separation rates vary from state to state depending on the median age of the work force in that state. Although estimates vary, rates for pharmacists in the West range from a low of 1.4 percent in Wyoming to 2.5 percent in Colorado (see Appendix A). These rates mean that, on the average, 1.4 percent of the pharmacy positions in Wyoming and 2.5 percent of the positions in Colorado are vacated annually due to death or retirement, and these positions need to be filled by new or additional pharmacists each year.

Occupational outmobility refers to persons who leave the profession of pharmacy to assume a job in another field. The regional occupational outmobility rate for pharmacists (which also applies to individual states) is 1.7 percent.2 The geographical outmobility rate, which is 1.2 percent for the region, refers to pharmacists who leave their home state to practice pharmacy in another state.2

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[1]This report looks only at demand for practicing pharmacists (who have first professional degrees), not demand for pharmacy graduates who go into research or teaching.

[2]New York State Department of Labor, Studies in Occupational Projections: Estimating Annual Job Openings Resulting from Occupational and Geographical Outmobility. Division of Research and Statistics, Albany, New York, September 1981.

Growth. The second component of the annual demand for additional pharmacists is growth in the profession resulting from population growth or growth in the ratio of pharmacists per 100,000 population.

The ratio of pharmacists per 100,000 population is a measure of the density of the pharmacy work force available to meet the need for pharmacy services. As Table 2 showed, the ratio of pharmacists per 100,000 population varies considerably across states (from a low of 31.6 in Hawaii to 82.3 in North Dakota). The ratio also changes over time within individual states; for example, the ratio in Alaska increased from 21.6 in 1970 to 40.7 in 1982. The ratio of pharmacists per 100,000 population has increased in most western states during the past decade, although the regional figure has remained relatively constant over time (Table 2).

Variations in the pharmacist-to-population ratio are caused by a multitude of factors, many of which are difficult or impossible to quantify. Some of the most important factors are the aging of the population (or proportion of elderly in the population); changes in the availability, distribution, or utilization of physician manpower; the type and level of pharmacy services provided; the nature of third party payment systems; the percentage of the population living in rural areas; pharmaceutical advancements; changes in the regulation and practice of pharmacy; the conditions of demand for pharmacy services; the proportion of pharmacists' time devoted to those elements of practice that clearly demand professional training and skills; the utilization of pharmacy assistants or other support personnel; the construction of new medical and nursing home facilities; and the state of the economy. The effect of these variables on the ratio of pharmacists per 100,000 population can be seen clearly in the case of the relative age of the population. The elderly consume pharmaceutical products to a greater extent than younger persons; therefore, higher ratios (reflecting higher demand relative to population) tend to be found in states which have a large elderly population. Similarly, increases in the supply and utilization of physicians tend to increase per capita drug utilization, which in turn brings about higher pharmacist-to-population ratios.

The ratio of pharmacists per 100,000 population in any given locale is also dependent to some degree on the presence of schools of pharmacy within the vicinity. For example, ratios tend to be higher in states (and metropolitan areas) that have pharmacy schools than in states that do not have their own schools. Population growth may be another factor influencing the ratio; for example, California's low ratio may be due, in part, to its population growth outstripping the capacity of the state's three pharmacy schools to train sufficient numbers of pharmacists to keep the ratio at or near the regional average.

If the factors that influence the ratio change over time, then the ratio can also be expected to change. Increases in the utilization of pharmacy assistants, for example, may result in decreased demand for pharmacists. In the absence of other changes, this would, in turn, be reflected in lower pharmacist-to-population ratios and fewer job openings for new pharmacists. In contrast, an increase in the demand for pharmacists relative to the population (i.e., an increase in the ratio) would result in more job openings for new pharmacists. This is what is meant by demand for new or additional pharmacists due to growth in the professi

Growth in the profession also results from population growth. Very simply, as the population of a state or region grows, an increasing number of practicing pharmacists are needed to serve that population. The population of the western states is projected to grow from an estimated 47,399,940 in 1985 to 55,798,450 in 2000, an increase of 17.7 percent (see Appendix B). This population increase means that new pharmacy positions will need to be created to accommodate the growth in need for services.

In summary, there are two components to the projected annual demand for new or additional pharmacists in the WICHE states: (1) pharmacists needed to replace those who leave the profession in each state (replacement); and (2) pharmacists needed to fill completely new positions created to accommodate population growth or growth in the pharmacist-to-population ratio (growth in the profession).

Methodology for Projecting Demand

Three alternative sets of projections of the annual demand for new or additional pharmacists in the WICHE region were calculated using estimated annual replacement rates, population growth, and ratios of pharmacists per 100,000 population. These projections, presented in Table 15 and Figure 7, show the total number of annual job openings for pharmacists that can be anticipated in each state in 1985, 1990, 1995, and 2000. Appendix C breaks down total job openings by state into openings due to replacement and openings due to growth. As the appendix shows, between 70 and 90 percent of all projected job openings in the region are due to replacement, and only 10 to 30 percent are due to growth in the profession. Appendix D shows the formulas employed in projecting the annual demand for pharmacists in each WICHE state.

Any method for projecting the demand for additional pharmacists involves certain assumptions about population growth, changes in the ratio of pharmacists per 100,000 population, and anticipated replacement rates for pharmacists. Our assumptions regarding each of these factors as they relate to three alternative projections of demand are discussed separately below.

Population Growth. State and regional population projections for the years 1985-2000 were obtained from the National Planning Association (NPA).[3] The NPA projections are based on the 1980 U.S. census, and utilize a complex set of assumptions concerning economic growth, demographic patterns, migration trends, etc. Appendix B presents NPA population projections for the WICHE states in 1985 and 2000. The NPA projections were used in calculating all three series of demand projections.

Ratios. As indicated above, a multitude of factors cause variations in pharmacist-to-population ratios over time and across geographical areas. The effects of many of those variables are nonquantifiable or extremely difficult to measure, and their future occurrence is highly uncertain. This makes it difficult to project the level of services that will be required to meet future needs and limits the usefulness of purely statistical techniques that

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[3] U.S. Bureau of the Census projections are for 10-year intervals only.

Table 15

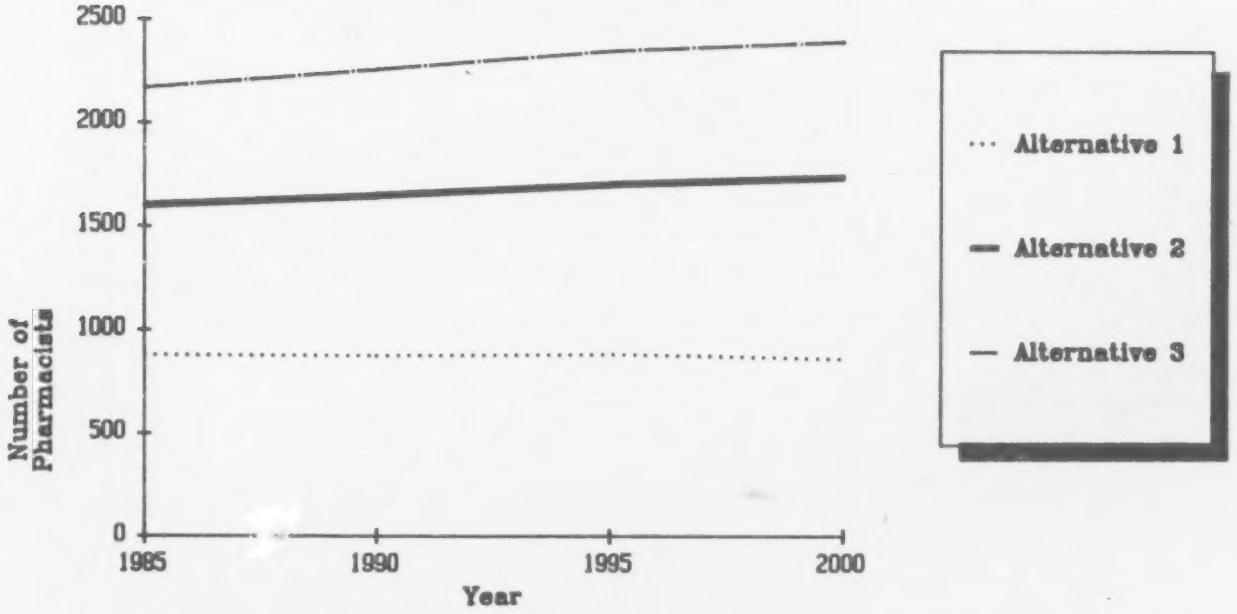
Projected Annual Demand for Additional Pharmacists
in the WICHE States, 1985 to 2000

Total Annual Job Openings

State	1985			1990			1995			2000		
	Alt. 1	Alt. 2	Alt. 3	Alt. 1	Alt. 2	Alt. 3	Alt. 1	Alt. 2	Alt. 3	Alt. 1	Alt. 2	Alt. 3
Alaska	7	12	22	8	13	24	8	15	27	9	16	30
Arizona	90	149	199	90	152	211	93	159	225	92	160	233
California	362	665	914	343	665	929	341	703	956	322	697	960
Colorado	78	138	196	77	139	203	78	143	211	74	142	212
Hawaii	10	18	31	12	22	35	13	24	38	15	28	41
Idaho	23	40	60	26	45	65	26	47	68	26	48	71
Montana	15	34	55	17	36	58	17	36	60	16	36	60
Nevada	15	28	39	17	29	42	19	33	48	21	35	52
New Mexico	25	50	56	25	50	58	25	50	60	24	50	61
North Dakota	9	25	27	11	27	29	11	27	30	11	28	30
Oregon	68	124	183	68	128	190	67	131	198	64	136	201
Utah	48	82	97	51	89	104	52	95	109	52	97	114
Washington	125	211	271	131	229	291	132	234	304	133	241	316
Wyoming	10	20	21	10	21	22	11	23	24	11	24	24
WICHE Region*	878	1,600	2,173	873	1,644	2,256	881	1,698	2,346	856	1,741	2,390

*Regional figures are not the sum of state totals. Separate projections were performed for the region to avoid the effect of compounding any measurement error existing at the state level.

Figure 7
Projected Annual Demand for Additional Pharmacists in the WICHE Region, 1985-2000



Source: Table 15

rely on linear projections of past trends.[4] Because of the difficulties inherent in any attempt to project future ratios, all three of the alternative demand projections used here allow the pharmacist-to-population ratio for each WICHE state and the region as a whole to remain constant at its 1982 level (the most recent year for which consistent data were available).[5]

This method of projecting demand provides an estimate of the number of additional pharmacists who will be needed each year in order to maintain a balance of supply and demand at the 1982 ratio. Although both actual and required ratios will vary from year to year, this method allows for the most conservative and reliable estimates of demand. If pharmacists' roles (or other variables that affect the ratio) change significantly in the future, then actual demand will differ from these projections. Should that occur, policymakers will want to apply their knowledge of such events to adjust the projections in this report. In any case, changes in the ratio are only one component of the demand for additional pharmacists, and account for very few of the job openings for new pharmacists relative to the primary determinant of demand, which is the replacement rate.

Replacement Rates. Estimates of the replacement rates for pharmacists range from 2.3 percent (U.S. Department of Health and Human Services) to 5.9 percent (U.S. Department of Labor) nationally. Since replacement accounts for most of the job openings for new pharmacists, the replacement rate one uses in projecting demand has a profound impact upon the projected balance of supply and demand. For example, the U.S. Department of Health and Human Services, which uses a national replacement rate of approximately 2.3 percent, projects that the total supply of pharmacists nationwide will exceed demand by approximately 4 percent in 1990 and 1.5 percent in 2000.[6] In contrast, applying the U.S. Department of Labor rate (5.9 percent) to the same projections results in an estimated shortage of pharmacists by 1995. Because of the lack of consensus on the present or future replacement rate for pharmacists, our projection

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[4]It may be possible to construct a consensus judgment of pharmacy leaders and educators as to what the ratio will look like in future years. While this may be feasible in a very general sense at the national or regional level, we believe that any attempt to make specific judgments at the state level would be less reliable.

[5]Even this method is limited by the fact that there are differing estimates of the ratio of pharmacists per 100,000 population in each state. Not only do population estimates vary, but counts of the number of practicing pharmacists in each state differ as well. For example, the New Mexico Employment Security Department estimates that there were 500 practicing pharmacists in New Mexico in 1981. The U.S. Department of Health and Human Services estimates that there were approximately 750, and the National Association of Boards of Pharmacy estimates that there were 812. Similarly, the Washington Council for Postsecondary Education notes that estimates of the ratio of pharmacists per 100,000 population in the state of Washington range from 56.5 to 70.7. The ratios used are quoted in the U.S. Department of Health and Human Services' Report to the President and Congress on the Status of Health Personnel in the United States, May 1984.

[6]Third Report to the President and Congress on the Status of Health Professions Personnel in the United States, 1982.

alternatives employ three different estimates of the replacement rate in each WICHE state and the region as a whole. Appendix A presents the three alternative estimates of the replacement rate for pharmacists in the WICHE states. These rates show the estimated percent of all practicing pharmacists who will need to be replaced by new or additional pharmacists each year.

Projection Models. In computing our three alternative series of demand projections, state-specific pharmacist-to-population ratios, population projections, and replacement rates were simply inserted into the formulas in Appendix D to derive the total projected number of annual job openings for new or additional pharmacists in each WICHE state and the region as a whole in 1985, 1990, 1995, and 2000. Since both ratios and population projections are identical for all three alternatives, projections of the demand for new pharmacists (or job openings) due to growth in the profession are the same for all three alternatives.[7] The only component of demand that varies for the three alternatives is demand due to replacement. The three alternative projection models for replacement are described below.

Alternative 1--The first alternative series of demand projections, which comprises the most conservative estimate of demand, utilizes average annual replacement rates derived from national data provided by the U.S. Department of Health and Human Services (DHHS). The DHHS rates include only separations resulting from death or retirement, and are based on sex- and age-specific death and retirement rates nationwide. These rates were applied to the projected sex and age distribution of the pharmacist work force in each state (also provided by DHHS) to derive state-specific replacement rates. Alternative 1 rates are the average of the DHHS rates for 1985, 1990, 1995, and 2000. The rates range from a low of 1.4 percent in Wyoming to 2.5 percent in Colorado. The regional rate is 2.1 percent (See Appendix A).

These rates appear too low at the state level because they do not take into account geographical or occupational outmobility as described earlier. Alternative 1 is included because it corresponds to the methodology normally utilized in manpower projections by state and federal governments.

Alternative 2--The second or middle alternative is based on the same DHHS separation rates used in Alternative 1, except that the rates are differentiated for 1985, 1990, 1995, and 2000. In addition, the state-specific DHHS separation rates are augmented by occupational and geographical outmobility rates derived from data provided by the New York State Department of Labor.[8] According to the New York Department of Labor, most manpower projections vastly underestimate job openings—by as much as 50 percent in some cases—because they do not consider outmobility from the profession.

State-specific outmobility rates were not available, so the regional figures of 1.7 percent occupational outmobility and 1.2 percent geographical

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[7] In this case, growth in the profession refers only to population growth, since the ratio of pharmacists per 100,000 population is held constant over time.

[8] New York State Department of Labor, Studies in Occupational Projections: Estimating Annual Job Openings Resulting from Occupational and Geographic Outmobility. Division of Research and Statistics, Albany, New York, September 1981.

outmobility were employed.[9] This resulted in a total replacement rate (including separations, occupational outmobility, and geographical outmobility) of 5.0 percent for the WICHE region in 1985 and 5.1 percent in 2000. Rates for individual states in 2000 range from 4.4 percent in Wyoming to 5.4 percent in Colorado (Appendix A).

Alternative 3--The third alternative, which provides the highest estimate of demand, is based on average annual replacement rates derived from data provided by the departments of labor (DOL) or employment security in each state. The basic DOL rates include only separations resulting from death or retirement. In this alternative, separation rates are augmented by the occupational outmobility and geographical outmobility rates discussed earlier (1.7 percent and 1.2 percent, respectively). These total rates appear to be too high because they utilize the highest available estimates of the separation rate for pharmacists, but they are included as an alternative in the event that changes in the economy or in the profession of pharmacy result in higher replacement rates than have been true in the recent past.

Alternative 3 replacement rates range from 4.4 percent in Wyoming to 10.2 percent in Alaska, with a rate of 7.3 percent for the region as a whole (Appendix A). Employment projections (or replacement rates) were not available for Idaho. Since replacement rates are heavily dependent upon the age distribution of the work force, Idaho was attributed the separation rate of the state with the most comparable median age for the pharmacist work force (Colorado).

The discussion which follows is based primarily on the second (or middle) series of demand projections. However, policymakers need to be cognizant of the full range of possibilities represented by the three alternative projections of demand, since determining factors may vary throughout the projection period. As was the case with the supply projections in Chapter 2, the demand projections do not provide exact estimates of demand in each projection year. Rather, they are intended to serve as general guides concerning anticipated trends in the annual demand for new pharmacists.

Projected Annual Demand for Additional Pharmacists in the WICHE States

As Table 15 and Figure 7 show, the annual demand for additional pharmacists (i.e., the number of job openings annually) is expected to increase in the WICHE region as a whole between 1985 and 2000. Alternative 2 projects a demand for approximately 1,600 new or additional pharmacists in the region in 1985, 1,640 in 1990, 1,700 in 1995, and 1,740 in 2000, an increase of approximately 9 percent over the entire projection period. This increase in the annual demand for new pharmacists is due primarily to population growth, since

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[9]These projections may underestimate job openings due to geographic outmobility. Data collected from a 2.5 percent sample of the U.S. census suggest that as many as 2.3 percent of the practicing pharmacists in the WICHE states in 1980 migrated to other states. U.S. Bureau of the Census, 1980, Public Use Microdata Sample, File A. Analysis performed by Applied Population Laboratory, University of Wisconsin-Madison.

projected replacement rates do not change significantly over time (Appendix A). The other two alternatives project a regional demand for approximately 850 (Alternative 1) and 2,390 (Alternative 3) additional pharmacists annually by the year 2000.10

All WICHE states except New Mexico are expected to show increases between 1985 and 2000 in the annual demand for additional pharmacists (demand in New Mexico is expected to remain stable, see Table 15 and Figure 8 in Appendix E). The size of the projected demand for new pharmacists ranges from approximately 15 annually in Alaska to approximately 700 annually in California. Most WICHE states are projected to have a demand for 25-150 new pharmacists each year.

Other Determining Factors

A number of factors may make the actual demand for new pharmacists differ from projected demand. One of the most important of these factors is the changing nature of the pharmacist's role. In recent years there has been a centralization of pharmacy practice in chain stores and hospitals. Some experts argue that this may enhance productivity and, therefore, moderate the demand for pharmacists. Another factor that may contribute to increased productivity (and, therefore, to a reduction in demand) is the increased utilization of pharmacy aides or assistants (see Introduction).

In the past few years pharmacy education has witnessed a shift toward a more clinical orientation in pharmacy practice. The effect of this trend on the demand for pharmacists is not known, but it is possible that a more extensive clinical orientation will result in increased demand as pharmacists devote a greater proportion of their time to clinical consultation with physicians and patients.

Other environmental factors that may cause actual demand to differ from projected demand include the following:

1. The aging of the population. The proportion of elderly in the population is increasing faster in the West than in much of the rest of the country (for example, the U.S. Census Bureau projects that the percentage of persons aged 65 or over in Arizona will increase from

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[10]Alternatives 2 and 3 accurately reflect projected job openings in the WICHE states, but they may overestimate the actual number of pharmacists who will need to be replaced in the region each year. This is because the regional replacement rates used in the projections are weighted means derived from the replacement rates for pharmacists in each state. This means that the regional rates include the 1.2 percent geographical outmobility rate that was applied to each state. Unfortunately, while each state may have a geographical outmobility rate of approximately 1.2 percent, the meaning of the rate is somewhat obscured at the regional level since not all of those who leave their home state to practice will also leave the region. Thus, the net loss of pharmacists from the region may be somewhat less than these projections of job openings would indicate. Since data are not available on interregional migration of pharmacists, the 1.2 percent geographical outmobility rate was applied to the region as well as individual states. However, the reader should bear in mind that the actual regional demand for new or additional pharmacists may be somewhat smaller than the regional totals presented in Table 15.

11.3 percent in 1980 to 15.1 percent in 2000). This means that required pharmacist-to-population ratios may increase, and these projections may provide conservative estimates of demand in those states with high proportions of the elderly;

2. Changing migration patterns, which may affect the movement of pharmacists within and outside the region as well as population growth patterns in individual states;

3. Changes in the economy in individual states and the region, which may affect the ratio of pharmacists to 100,000 population (and hence relative demand);

4. Changes in state regulations which expand or limit the pharmacist's role and that of pharmacy assistants;

5. Changes in health practices and medical systems, which may bring about changes in per capita drug utilization;

6. The ratio of women to men among active pharmacists; and

7. Technical developments (such as automation and computerization) in the practice of pharmacy.

In summary, the projected increases throughout the 1980s and 1990s in the annual demand for new or additional pharmacists assume a constant ratio of pharmacists per 100,000 population. The projections will prove most beneficial to long-range planning efforts if they are used in conjunction with information concerning other environmental factors that may alter the demand for pharmacy services. The multitude of nonquantifiable factors that affect the demand for pharmacists means that periodic studies will be needed to take into account changes in projected demand resulting from those factors.

4. A COMPARISON OF THE SUPPLY AND DEMAND FOR PHARMACISTS IN THE WICHE STATES

The comparison of supply and demand in this chapter provides an indication of what may happen in the region if current trends continue rather than a definitive estimate of the future surplus or shortage of pharmacists in the WICHE states. Although the projections of supply and demand in this report are not predictions, they can be used to draw inferences about manpower problems which may arise if the assumptions underlying them hold true.

It is important to reiterate that the demand projections refer to the total annual demand for new or additional pharmacists in the WICHE region, while the supply projections refer only to the annual supply of new pharmacy graduates. Chapter 2 discussed the fact that the total supply of new or additional pharmacists in each state has three components: (1) new pharmacy graduates; (2) in-migrating pharmacists from other states; and (3) inactive pharmacists reentering the labor market. Few hard data are available concerning the second and third components of total supply. This makes it difficult to project how much these components will contribute to total supply. However, if pharmacists reentering the labor market are assumed to contribute very little to total supply, inferences can be drawn about the contribution of in-migrating pharmacists to total supply by subtracting the number of new pharmacy graduates produced in each state from the total demand for additional pharmacists in that state. This chapter makes that comparison for each WICHE state and the region as a whole in 1985, 1990, 1995, and 2000. These estimates show how large the in-migration and reentry components of supply will have to be in order for the states to maintain a balance between supply and demand.

Comparison of Supply and Demand

Table 16 and Figure 8 compare the projected annual supply of new pharmacy graduates in the WICHE region with the projected annual demand for additional pharmacists. The table and figure show that there is a sizable discrepancy between projected supply and projected demand in the WICHE states. Demand in the region as a whole is expected to exceed supply by more than 720 new pharmacists in 1985, and the number is expected to increase to over 1,000 by the year 2000.

It is important to note that the differences between demand and supply shown in Table 16 and Figure 8 do not necessarily mean that the WICHE region will experience a shortage of pharmacists throughout the rest of the decade and 1990s. Rather, the table and figure show that the annual supply of new pharmacy graduates in the region will need to be augmented in some fashion in order to meet projected demand. As has been true in the past, the supply of new pharmacy graduates in the WICHE states will in all likelihood be augmented by a significant number of in-migrating pharmacists from other states. Data

Table 16

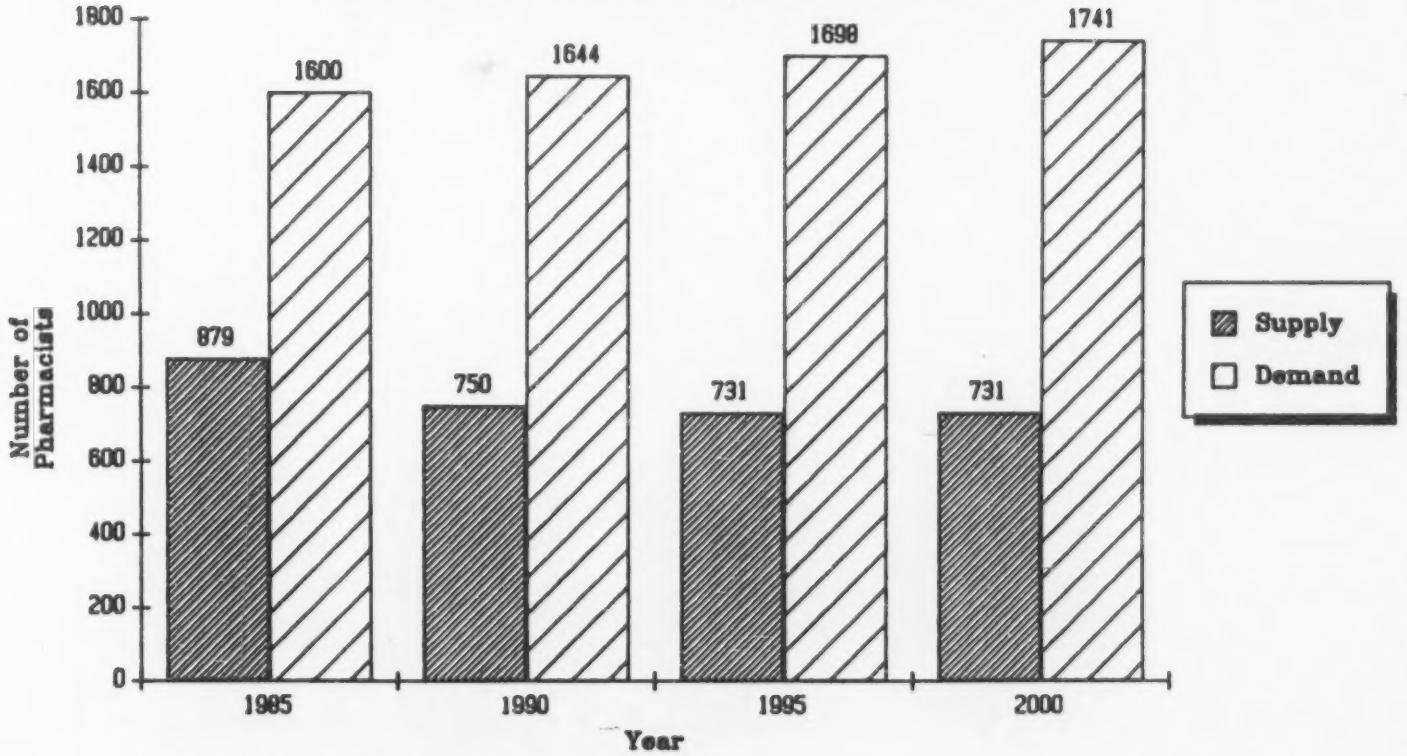
Comparison of Projected Annual Supply of New Pharmacy Graduates and Projected Annual Demand for Additional Pharmacists in the WICHE States, 1985 to 2000*

State	1985		1990		1995		2000	
	Shortage or (Surplus)	Demand/ Supply Ratio	Shortage or (Surplus)	Demand/ Supply Ratio	Shortage or (Surplus)	Demand/ Supply Ratio	Shortage or (Surplus)	Demand/ Supply Ratio
Alaska**	12	—	13	—	15	—	16	—
Arizona	107	3.5	116	4.2	124	4.5	125	4.6
California	326	2.0	376	2.3	421	2.5	415	2.5
Colorado	86	2.6	95	3.1	100	3.3	99	3.3
Hawaii**	18	—	22	—	24	—	28	—
Idaho	(11)	.8	1	1.0	5	1.1	6	1.1
Montana	3	1.1	10	1.4	11	1.4	11	1.4
Nevada**	28	—	29	—	33	—	35	—
New Mexico	4	1.1	11	1.3	12	1.3	12	1.3
North Dakota	(43)	.4	(31)	.5	(30)	.5	(29)	.5
Oregon	64	2.1	77	2.5	81	2.6	86	2.7
Utah	29	1.5	44	2.0	51	2.2	53	2.2
Washington	103	2.0	137	2.5	144	2.6	151	2.7
Wyoming	(13)	.6	(7)	.8	(4)	.8	(3)	.9
Region	721	1.8	894	2.2	967	2.3	1,010	2.4

* Taken from Alternative 2 supply projections (Table 14 in Chapter 2) and Alternative 2 demand projections (Table 15 in Chapter 3)

** No pharmacy school

Figure 8
Comparison of Projected Annual Supply of New Pharmacy Graduates and Projected Annual Demand for Additional Pharmacists in the WICHE Region, 1985-2000



Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections

Source: Tables 14 and 15

from the 1980 U.S. census show that between 1975 and 1980, the WICHE region imported more than 46 percent of its supply of new pharmacists.[1]

Unemployment data for pharmacists suggest that the nation and the WICHE region are in overall balance in terms of the supply and demand for pharmacists. Experts estimate that the national unemployment rate for pharmacists is only approximately 4 percent.[2] While state and regional figures are not generally available, the Oregon Department of Human Resources, for example, estimates that the unemployment rate for pharmacists in Oregon was only approximately 1 percent in 1983.

Assuming that reentrants to the labor force contribute only minimally to total supply, a comparison of Tables 15 and 16 shows that the West may import as many as 45 percent of its new pharmacists in 1985; this number could increase to 58 percent by the year 2000 (absent some major change in pharmacy enrollments in the region).[3] To look at the problem differently, these projections suggest that the supply of new pharmacy graduates in the region will meet only 55 percent of the demand for new pharmacists in 1985 and 42 percent of demand by the year 2000. Thus, the region will have to rely on in-migrating pharmacists to fill an increasing proportion of the job openings for new pharmacists if supply and demand are to remain in approximate balance. Table 16 shows that the greatest increase in the demand for in-migrating pharmacists will occur between 1985 and 1990; the rate of increase will slow considerably by the end of the century.

If the West does not attract an increasing number of pharmacists from outside the region, actual growth in the profession may be less than expected. In other words, the ratio of pharmacists per 100,000 population may simply decline. This will not necessarily be experienced as a shortage of pharmacists if the profession is able to find ways to provide the same or similar services with fewer pharmacists (for example, through greater utilization of pharmacy assistants or other means of enhancing productivity).

Projections for most individual WICHE states (Table 16 and Figure 8 in Appendix E) show the same general pattern as the projections for the region as a whole. Among the states that have their own pharmacy schools, the demand for additional pharmacists in 1985 is expected to be at least twice as large as the supply of new pharmacy graduates in Arizona, California, Colorado,

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[1]U.S. Bureau of the Census, 1980, Public Use Microdata Sample, File A. Analysis performed by Applied Population Laboratory, University of Wisconsin-Madison.

[2]Stanley Harmen, "Pharmacy Manpower: Oversupply...or Shortage?" American Druggist, February 1981; supported by 1984 data from the U.S. Department of Labor.

[3]Table 16 may provide a conservative estimate of the need to import pharmacists from other states because it assumes that there is no substantial out-migration of new pharmacy graduates from the states in which they were trained. While the precise amount of out-migration is not known, it is reasonable to conclude that most states export some of their graduating pharmacists (see discussion in Chapter 2). Additionally, these projections consider supply and demand for each year as a discrete time period. This does not take into account the fact that shortages may accumulate over time.

Oregon, and Washington. Projected demand in 1985 will be approximately 1.5 times as large as projected supply in Utah, and supply and demand will be roughly in balance in Montana and New Mexico. Idaho and Wyoming will have a slight surplus of new pharmacy graduates, and North Dakota will have a considerable surplus, suggesting that it will export many of its graduates to other states.

Since the annual supply of new pharmacy graduates in all states is expected to decrease over time and annual demand is generally expected to increase slightly or remain stable, the discrepancy between supply and demand may be even more pronounced by the end of the century in most WICHE states. By the year 2000, only Idaho, North Dakota, and Wyoming can be expected to produce enough new pharmacy graduates to meet their own needs.[4]

Conclusion

A large proportion of the supply of new pharmacists in the WICHE region comes from outside the region, and the proportion is expected to increase over time. The West should receive continued in-migration of pharmacists from outside the region but at a level difficult to predict. It may become increasingly difficult to import a large number of pharmacists from outside the region as pharmacy enrollments continue to decline nationwide--all parts of the country will need to compete for a decreasing number of new pharmacy graduates to fill an increasing number of job openings.

It is important to recognize that the region may not have to import an increasing number of pharmacists from other states if policymakers can find ways to increase the number of new pharmacy graduates in the region and/or increase the number of inactive pharmacists reentering the labor market. The profession may also be able to find ways to meet the need for pharmacy services with fewer pharmacists, thereby reducing relative demand (i.e., the ratio of pharmacists per 100,000 population may simply decline).

Conversely, it is also important to recognize that the WICHE region does not necessarily need to increase pharmacy enrollments in order to meet the increase in demand. However, enrollments may have to increase significantly in most western states if supply and demand are to remain in approximate balance without a substantial increase in the number of in-migrating pharmacists. States may want to consider setting in-state enrollment goals which will maintain the ratio of the 1970s and early 1980s between pharmacists educated inside the state and those migrating from out of state. Altering enrollment trends in this way will permit the West to avert a decline in the ratio of pharmacists per 100,000 population without increasing its current level of reliance on pharmacists from other states.

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[4]Statistically these states will produce enough new graduates to meet their own needs. However, this does not take into account the fact that the pharmacy programs in all three states enroll a majority of out-of-state students (Chapter 1), some of whom may leave the state after they graduate. See discussion in Chapter 2.

Finally, there are a number of environmental factors that may alter the projected balance between supply and demand. Among the most important factors (discussed in Chapters 2 and 3) are:

1. Changes in student demand for pharmacy training;

2. Changes in interstate migration patterns;

3. Changes in the proportion of elderly in the population;

4. The composition of the pharmacy work force by sex;

5. Changes in pharmacy education, such as the trend toward the six-year clinical Doctor of Pharmacy degree;

6. Changes in the role of pharmacists relative to other employees in the pharmacy setting; and

7. Changes in the organization and techniques of pharmacy practice.

Policymakers need to monitor the effects of these factors in using these comparisons of supply and demand to enhance long-range planning efforts. If used in that manner, the projections can assist policymakers to ensure that pharmacy education is adequate to meet future needs.

CONCLUSION: A REGIONAL APPROACH TO ADDRESSING MANPOWER PROBLEMS

While the annual supply of new pharmacy graduates in the WICHE region is expected to decline substantially throughout the rest of this decade and the early 1990s, the annual demand for additional pharmacists is generally expected to increase. These trends suggest that the region may face a shortage of practicing pharmacists by the end of the century. If enrollments in existing schools of pharmacy do not increase, greater numbers of pharmacists will have to migrate into the region to fill available job openings.

All indications are that the current supply and demand for pharmacists in the WICHE region are roughly in balance, but that a large proportion of pharmacists in the West come from outside the region. While this is a relatively inexpensive way of acquiring pharmacy manpower, western states will want to consider whether it is advisable to rely upon continued, substantial in-migration as a source of future pharmacists and whether it will be feasible to rely increasingly upon in-migrating pharmacists as the competition for new graduates intensifies nationwide. The national enrollment pattern suggests that such migration may be an unrealistic expectation.

In drawing these inferences, we want to emphasize that the database on pharmacy manpower is weak. Inconsistencies in the data cause wide variations in estimates of supply and demand and make it difficult to determine (except by inference) how much in-migrating pharmacists contribute to total supply. As a first step in addressing the need for pharmacy manpower, the profession needs to determine (perhaps through a series of regional or national task forces) the data requirements for policymaking and manpower analysis and initiate the development of a sound database on which more definitive manpower projections can be based.

Regional approaches may help ensure that pharmacy education programs in the western states continue to meet the needs of the population for pharmacy services. The issue of demand for pharmacy manpower is exceedingly complex. Regional meetings to study the problem, particularly as it relates to the future of pharmacy education and the nature of the pharmacist's role, will help the states take an active part in shaping the profession to meet the needs of the region through the rest of this century.

Regional planning and cooperation will also offer a creative mechanism for ensuring that the West does not suffer from a shortage of pharmacists in the next 10 or 15 years. Regional task forces would be an appropriate vehicle for the generation of recommendations aimed at strengthening pharmacy education and the profession of pharmacy in the western states. Some of the issues which need to be addressed by such task forces have been underscored in this report: the development of a strong database for the field of pharmacy; the implications of projected declines in the production of new pharmacy graduates in the face of projected increases in the annual demand for new pharmacists; the extent of interstate migration of pharmacists; appropriate levels of reliance on in-migrating pharmacists and ways to attract increasing numbers of external pharmacists should that prove necessary; ways to increase enrollments in schools of pharmacy; future developments in pharmacy education, pharmacy

practice, health care delivery, and population demographics which may impact upon the demand for pharmacy manpower; and ways to meet society's need for pharmacy services with fewer pharmacists in the event a shortage should occur.

A particularly fruitful topic for discussion at the regional level may be the development of regional pharmacy programs. Regional approaches may offer an innovative and cost-effective means of adapting to declining enrollments and increasing costs associated with movement toward the clinically oriented six-year Doctor of Pharmacy degree. Regional or joint programs may, in fact, prove necessary for states with small projected enrollments; if enrollments continue to decline as projected in this report, some programs may find that they are simply unable to survive alone. As the Final Report of the APhA Task Force on Pharmacy Education states:

> Given the Task Force recommendation that schools and colleges with adequate resources move toward the desired goal of an entry-level six-year Pharm.D. degree, "going it alone" does not appear to be the most realistic alternative for all schools of pharmacy....Consortial arrangements may be the only method by which many schools of pharmacy may be able to continue providing educational opportunities for students in various regions of the country...(Consortial arrangements) enable member institutions to expand and enrich education programs and, where feasible, to economize their operations through interinstitutional cooperation. (p. 37)

By enhancing resources at a few institutions rather than at all or many of the pharmacy programs in the WICHE states, regional programs offer a way to maintain or increase enrollments, enhance the quality of educational programming, and accommodate the need for expensive clinical instruction facilities at a significantly reduced cost to individual states. Regional programs may prove to be particularly beneficial to states such as Idaho, Montana, North Dakota, and Wyoming in which pharmacy programs serve large proportions of nonresident and foreign students. In short, regional programs serving the WICHE states could meet the needs of students from across the West with attendant reductions in cost for individual states.

As the difficulties facing the pharmacy profession become more apparent, its leaders will be pressed to find creative solutions that do not overly tax state and institutional budgets. It is hoped this report will stimulate lively and cooperative discussions among pharmacy leaders and educators as they seek to anticipate and shape the future of this critical profession.

APPENDICES

Appendix A: Annual Replacement Rates for Pharmacists in the WICHE States

Appendix B: Projected Population of the WICHE States, 1985 and 2000

Appendix C: Projected Annual Demand for Additional Pharmacists in the WICHE States, 1985 to 2000

Appendix D: Methodology for Projecting the Annual Demand for New or Additional Pharmacists in the WICHE States

Appendix E: Figures for Individual States

Figure 1: Enrollment in Pharmacy Programs*

Figure 3: Pharmacy Degrees Conferred*

Figure 8: Comparison of Projected Supply and Projected Demand, 1985-2000

Alaska
Arizona
California
Colorado
Hawaii
Idaho
Montana
Nevada
New Mexico
North Dakota
Oregon
Utah
Washington
Wyoming

*For states with pharmacy schools.

Appendix A

Annual Replacement Rates for Pharmacists in the WICHE States

	Alternative 1*	Alternative 2**				Alternative 3***
		1985	1990	1995	2000	
Alaska	1.8%	4.5%	4.6%	4.7%	4.8%	10.2%
Arizona	2.4	5.4	5.3	5.2	5.1	8.0
California	2.0	4.8	4.8	5.0	5.0	7.1
Colorado	2.5	5.5	5.4	5.4	5.4	8.4
Hawaii	2.3	5.0	5.1	5.3	5.4	8.8
Idaho	2.5	5.3	5.4	5.4	5.4	8.4
Montana	2.0	4.9	4.9	4.8	4.8	8.2
Nevada	2.0	5.1	4.8	4.8	4.7	7.9
New Mexico	1.9	5.0	4.8	4.7	4.7	5.8
North Dakota	1.6	4.5	4.5	4.4	4.5	4.9
Oregon	2.0	4.9	4.9	4.9	5.1	7.9
Utah	2.2	5.0	5.1	5.3	5.2	6.3
Washington	2.4	5.3	5.4	5.3	5.3	7.3
Wyoming	1.4	4.3	4.2	4.3	4.4	4.4
Region****	2.1	5.0	5.0	5.0	5.1	7.3

*Average annual replacement rates derived from data provided by the U.S. Department of Health and Human Services (DHHS). The DHHS rates include only separations resulting from death or retirement, and are based on sex- and age-specific death and retirement rates applied to the projected age and sex distribution of the pharmacist work force in each state. Alternative 1 rates are the average of the DHHS rates for 1985, 1990, 1995, and 2000.

**Annual replacement rates derived from data provided by the U.S. Department of Health and Human Services (DHHS), plus 1.7 percent occupational outmobility and 1.7 percent geographical outmobility. The basic DHHS rates include only separations resulting from death or retirement, and are based on sex- and age-specific death and retirement rates applied to the projected sex and age distribution of the pharmacist work force in each state in 1985, 1990, 1995, and 2000. Occupational and geographical outmobility rates were derived from data provided in New York State Department of Labor, Studies in Occupational Projections: Estimating Annual Job Openings Resulting from Occupational and Geographic Outmobility. Division of Research and Statistics, Albany, New York, September 1981.

***Average annual replacement rates provided by state departments of labor (DOL) or employment security, plus 1.7 percent occupational outmobility and 1.2 percent geographic outmobility. The basic DOL rates include only separations resulting from death, retirement, or leaving the work force. The rates for Alaska, Arizona, Hawaii, Montana, Nevada, North Dakota, and Wyoming were derived from DOL occupational employment projections for pharmacists. The rates for California, Colorado, New Mexico, Oregon, Utah, and Washington were obtained directly from the DOLs. Employment projections for pharmacists were not available for Idaho. Since replacement rates are heavily dependent upon the age distribution of the work force, Idaho was attributed the separation rate of the state with the most comparable median age for the pharmacist work force (Colorado).

****Regional figures are weighted averages.

Appendix B

Projected Population of the WICHE States,
1985 and 2000

State	Population in 1985	Population in 2000	Percent Change
Alaska	446,330	604,640	35.5
Arizona	3,024,370	3,871,200	28.0
California	25,313,170	28,970,700	14.4
Colorado	3,176,630	3,714,560	16.9
Hawaii	1,050,750	1,277,650	21.6
Idaho	1,030,930	1,232,830	19.6
Montana	827,260	891,000	7.7
Nevada	907,790	1,198,120	32.0
New Mexico	1,421,410	1,646,250	15.8
North Dakota	681,640	711,730	4.4
Oregon	2,793,100	3,306,260	18.4
Utah	1,655,200	2,094,760	26.6
Washington	4,537,420	5,646,390	24.4
Wyoming	533,940	632,350	18.4
WICHE Region	47,399,940	55,798,450	17.7

Source: National Planning Association, 1984.

Appendix C

Projected Annual Demand for Additional Pharmacists in the WICHE States, 1985 to 2000

1985

State	Alternative 1 Job Openings Due to: Growth	Replacement	Total*	Alternative 2 Job Openings Due to: Growth	Replacement	Total*	Alternative 3 Job Openings Due to: Growth	Replacement	Total*
Alaska	3.6	3.2	7	3.6	8.0	12	3.6	18.2	22
Arizona	43.1	46.9	90	43.1	105.5	149	43.1	156.2	199
California	144.8	216.8	362	144.8	520.4	665	144.8	769.7	914
Colorado	28.8	49.7	78	28.8	109.4	138	28.8	167.0	196
Hawaii	2.0	7.6	10	2.0	16.5	18	2.0	29.0	31
Idaho	7.2	15.7	23	7.2	33.2	40	7.2	52.6	60
Montana	2.3	12.9	15	2.3	31.7	34	2.3	53.1	55
Nevada	7.2	8.0	15	7.2	20.5	28	7.2	31.8	39
New Mexico	9.8	15.2	25	9.8	40.0	50	9.8	46.4	56
North Dakota	-.2	9.0	9	-.2	25.2	25	-.2	27.5	27
Oregon	29.4	38.8	68	29.4	95.0	124	29.4	153.2	183
Utah	22.5	26.0	48	22.5	59.0	82	22.5	74.4	97
Washington	53.1	71.7	125	53.1	158.3	211	53.1	218.0	271
Wyoming	4.2	5.3	10	4.2	16.2	20	4.2	16.6	21
WICHE Region**	354.5	523.1	878	354.5	1245.5	1600	354.5	1818.4	2173

1990

State	Alternative 1 Job Openings Due to: Growth	Replacement	Total*	Alternative 2 Job Openings Due to: Growth	Replacement	Total*	Alternative 3 Job Openings Due to: Growth	Replacement	Total*
Alaska	4.0	3.5	8	4.0	9.1	13	4.0	20.1	24
Arizona	38.2	51.7	90	38.2	114.2	152	38.2	172.4	211
California	113.6	229.8	343	113.6	551.6	665	113.6	815.8	929
Colorado	24.2	53.2	77	24.2	114.8	139	24.2	178.6	203
Hawaii	4.4	8.0	12	4.4	17.8	22	4.4	30.7	35
Idaho	8.8	16.7	26	8.8	36.1	45	8.8	56.2	65
Montana	3.4	13.3	17	3.4	32.5	36	3.4	54.4	58
Nevada	7.8	8.8	17	7.8	21.1	29	7.8	34.7	42
New Mexico	9.2	16.2	25	9.2	40.8	50	9.2	49.3	58
North Dakota	1.6	9.1	11	1.6	25.5	27	1.6	27.8	29
Oregon	26.1	41.5	68	26.1	101.8	128	26.1	164.1	190
Utah	22.7	28.5	51	22.7	66.1	89	22.7	81.6	104
Washington	53.0	78.2	131	53.0	175.9	229	53.0	237.8	291
Wyoming	4.5	5.6	10	4.5	16.8	21	4.5	17.6	22
WICHE Region**	314.1	558.7	873	314.1	1330.3	1644	314.1	1942.2	2256

1995

State	Alternative 1 Job Openings Due to: Growth	Replacement	Total*	Alternative 2 Job Openings Due to: Growth	Replacement	Total*	Alternative 3 Job Openings Due to: Growth	Replacement	Total*
Alaska	4.5	3.9	8	4.5	10.2	15	4.5	22.2	27
Arizona	37.0	56.4	93	37.0	122.1	159	37.0	187.9	225
California	100.0	241.2	341	100.0	603.0	703	100.0	856.2	956
Colorado	21.9	56.2	78	21.9	121.4	143	21.9	188.9	211
Hawaii	4.8	8.6	13	4.8	19.7	24	4.8	32.8	38
Idaho	8.3	17.8	26	8.3	38.4	47	8.3	59.7	68
Montana	3.8	13.6	17	3.8	32.7	36	3.8	56.8	60
Nevada	9.4	9.6	19	9.4	23.2	33	9.4	38.1	48
New Mexico	8.3	17.0	25	8.3	42.0	50	8.3	51.9	60
North Dakota	2.0	9.2	11	2.0	25.3	27	2.0	28.2	30
Oregon	23.3	44.1	67	23.3	108.0	131	23.3	174.2	198
Utah	20.8	30.9	52	20.8	74.4	95	20.8	88.4	109
Washington	47.4	84.4	132	47.4	186.3	234	47.4	256.6	304
Wyoming	5.0	5.9	11	5.0	18.2	23	5.0	18.7	24
WICHE Region**	289.5	591.6	881	289.5	1408.7	1698	289.5	2036.7	2346

2000

State	Alternative 1 Job Openings Due to: Growth	Replacement	Total*	Alternative 2 Job Openings Due to: Growth	Replacement	Total*	Alternative 3 Job Openings Due to: Growth	Replacement	Total*
Alaska	4.9	4.3	9	4.9	11.6	16	4.9	24.6	30
Arizona	31.3	60.6	92	31.3	128.7	160	31.3	201.9	233
California	72.3	250.0	322	72.3	625.0	697	72.3	887.6	960
Colorado	15.7	58.6	74	15.7	126.5	142	15.7	196.8	212
Hawaii	6.3	9.1	15	6.3	21.4	28	6.3	35.0	41
Idaho	7.6	18.8	26	7.6	40.5	48	7.6	63.0	71
Montana	2.5	13.9	16	2.5	33.4	36	2.5	57.1	60
Nevada	10.0	10.6	21	10.0	24.9	35	10.0	41.9	52
New Mexico	6.6	17.7	24	6.6	43.8	50	6.6	54.0	61
North Dakota	1.6	9.3	11	1.6	26.3	28	1.6	28.6	30
Oregon	18.3	46.2	64	18.3	117.9	136	18.3	182.7	201
Utah	18.9	33.1	52	18.9	78.2	97	18.9	94.8	114
Washington	42.9	89.8	133	42.9	198.2	241	42.9	273.0	316
Wyoming	4.8	6.3	11	4.8	19.7	24	4.8	19.7	24
WICHE Region**	236.6	619.6	856	236.6	1504.7	1741	236.6	2153.8	2390

*Rounded

**Regional figures are not the sum of state totals. Separate projections were performed for the region to avoid compounding any measurement error existing at the state level.

Appendix D

Methodology for Projecting the Annual Demand for New or Additional Pharmacists in the WICHE States

The annual demand for new or additional pharmacists has two components: job openings due to replacement and job openings due to growth in the profession (population growth or growth in the ratio of pharmacists per 100,000 population).

Replacement

Replacement needs were calculated as follows:

$$\text{Job openings due to replacement}_y = \text{Replacement rate}_y \times \text{Total number of pharmacists}_{y-1},$$

where y is the projection year, and

$$\text{Total number of pharmacists}_y = \text{Resident population}_y \times \frac{\text{Pharmacists}}{100{,}000 \text{ population}_y}$$

Growth

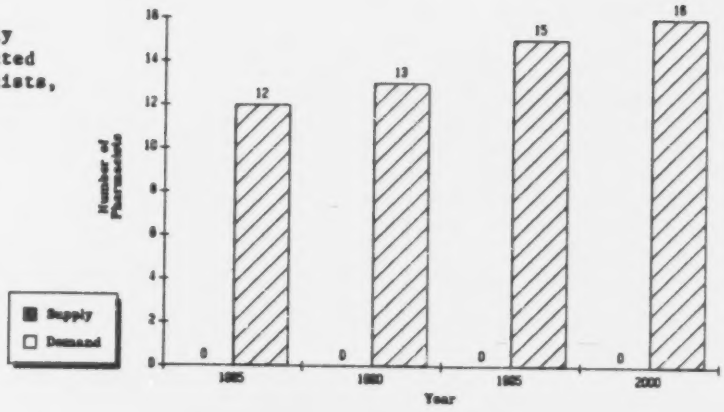
Job openings due to growth were calculated as follows:

$$\text{Job openings due to growth}_y = \text{Total number of pharmacists}_y - \text{Total number of pharmacists}_{y-1},$$

where y is the projection year

ALASKA

Figure 8
Comparison of Projected Annual Supply of New Pharmacy Graduates and Projected Annual Demand for Additional Pharmacists, 1985–2000



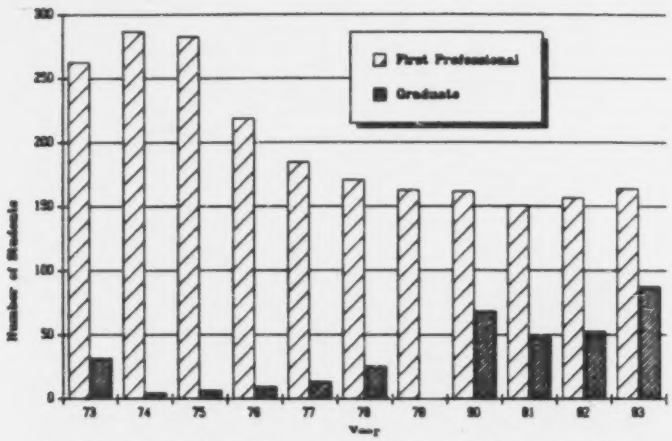
* No pharmacy school

Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections

Source: Tables 14 and 15

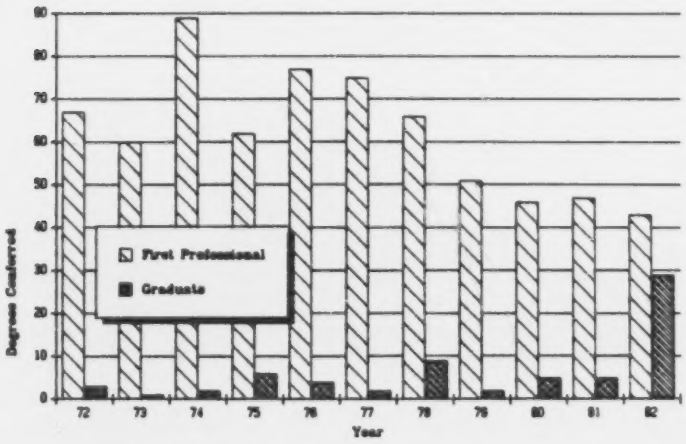
ARIZONA

Figure 1
Enrollment in Pharmacy Programs



Note: No graduate level data were available for 1979.
Source: Table 4

Figure 3
Pharmacy Degrees Conferred



Source: Table 9

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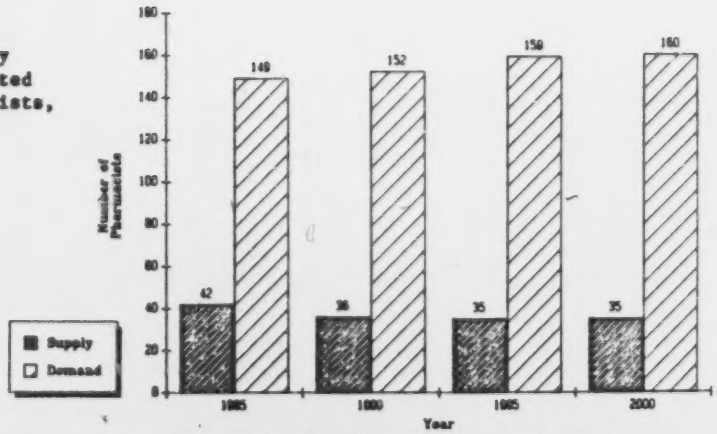

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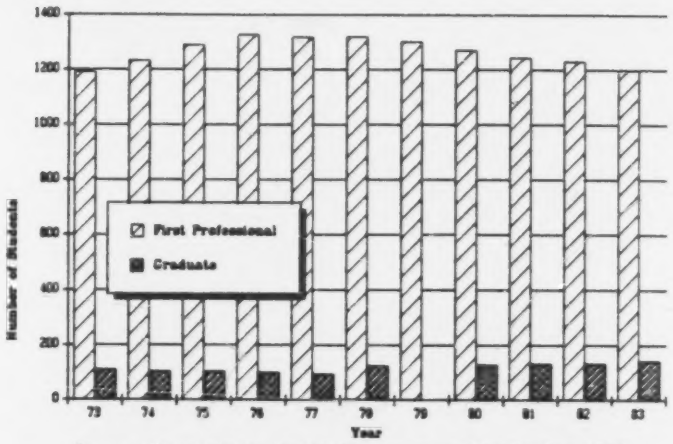

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Source: Table 4

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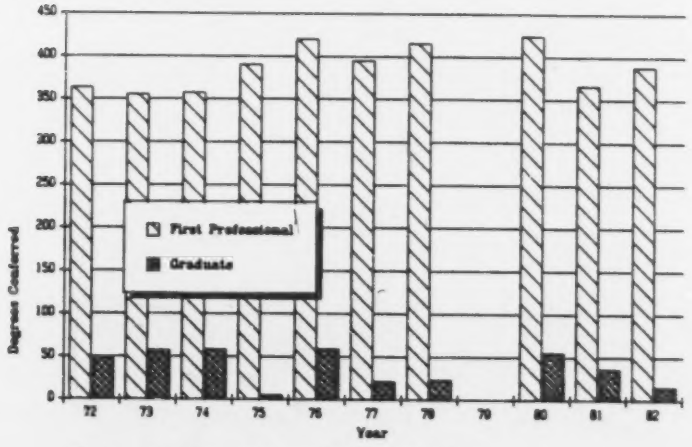
Pharmacy Degrees Conferred



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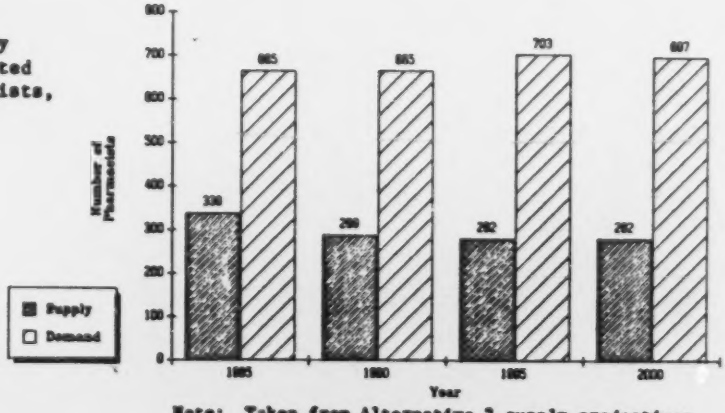

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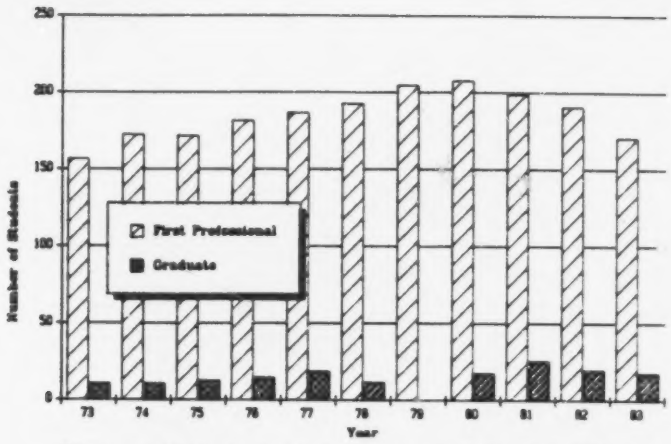

Note: No graduate level data were available for 1979
Source: Table 4

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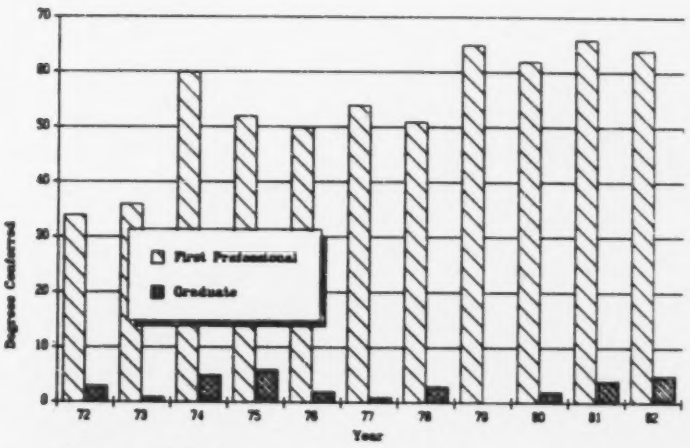
Pharmacy Degrees Conferred



Source: Table 9

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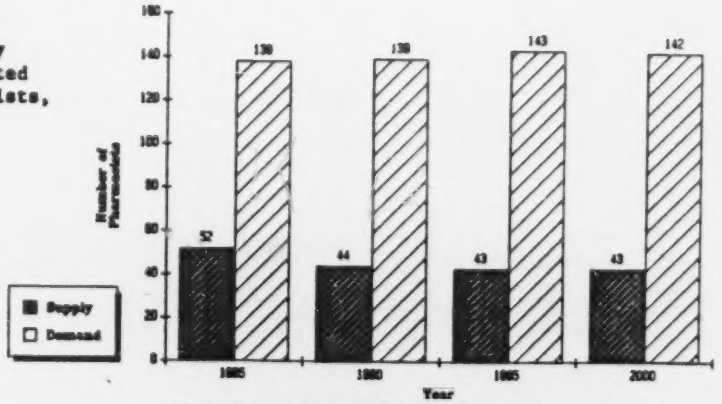

Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections
Source: Tables 14 and 15

HAWAII

Figure 8
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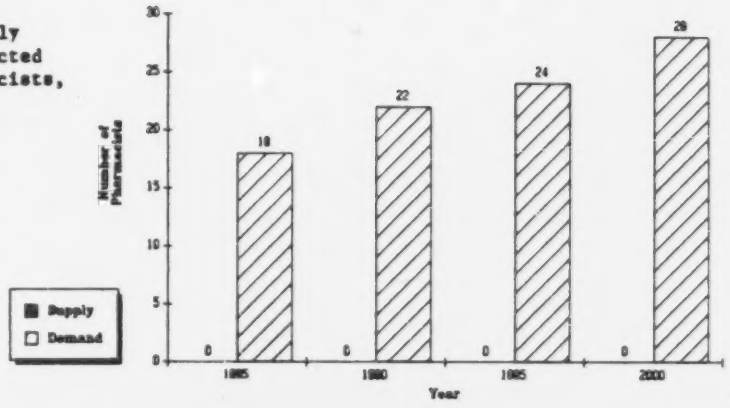


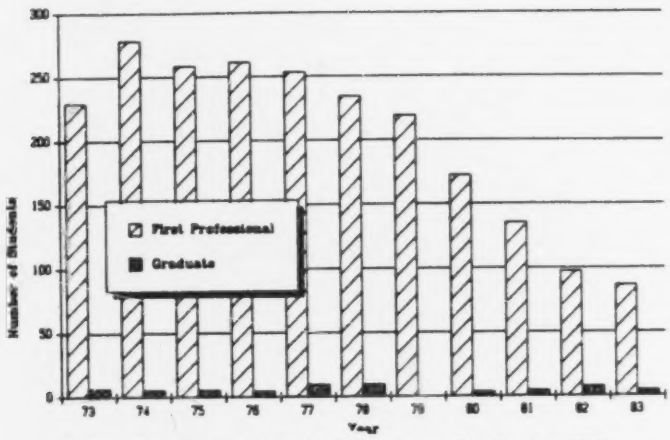
* No pharmacy school

Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections

Source: Tables 14 and 15

IDAHO

Figure 1
Enrollment in Pharmacy Programs



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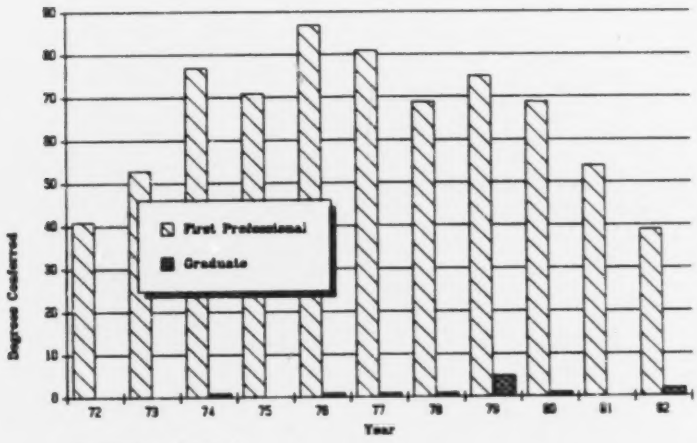

Source: Table 9

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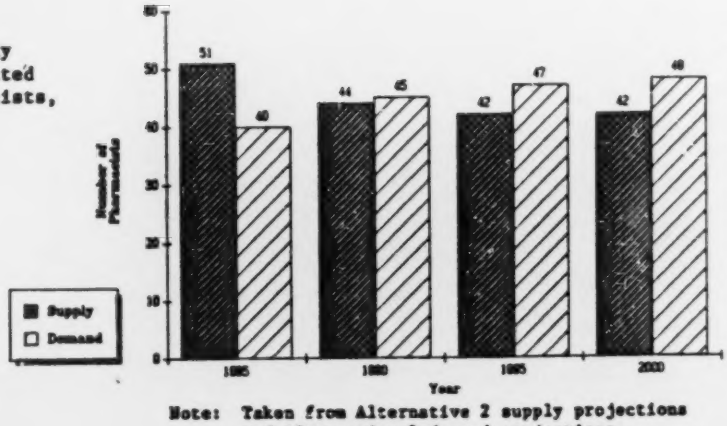

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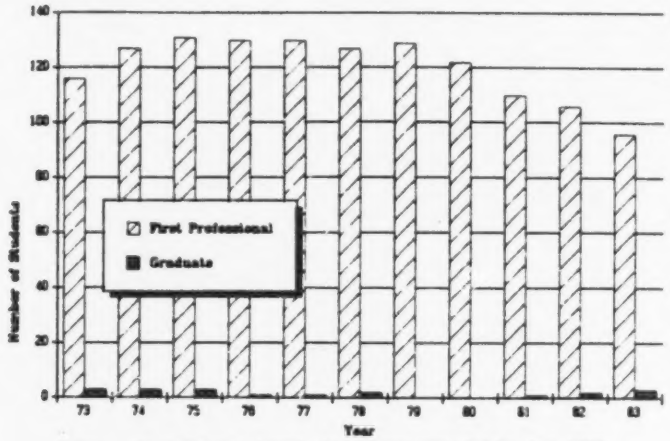
MONTANA

Figure 1
Enrollment in Pharmacy Programs



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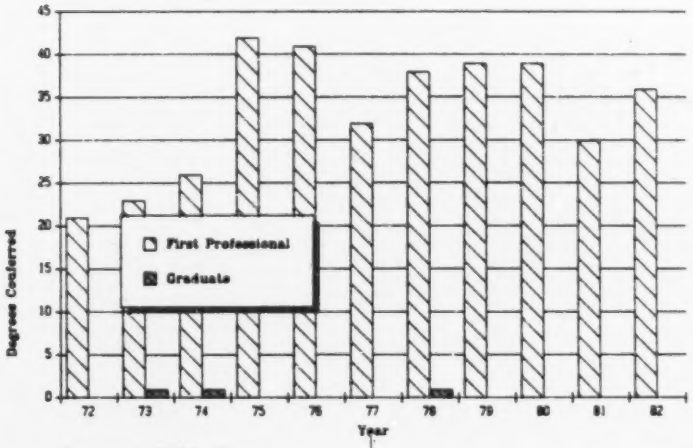

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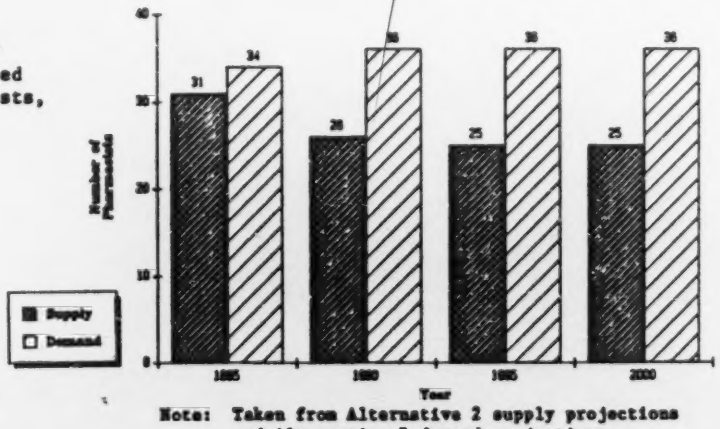
Figure 8
Comparison of Projected Annual Supply of New Pharmacy Graduates and Projected Annual Demand for Additional Pharmacists, 1985–2000



Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections
Source: Tables 14 and 15

NEVADA

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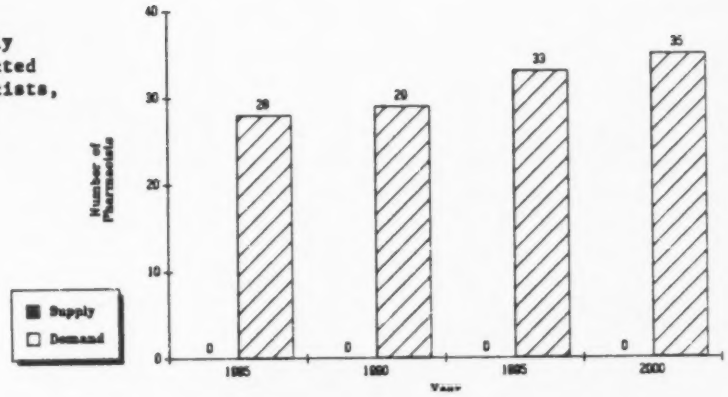
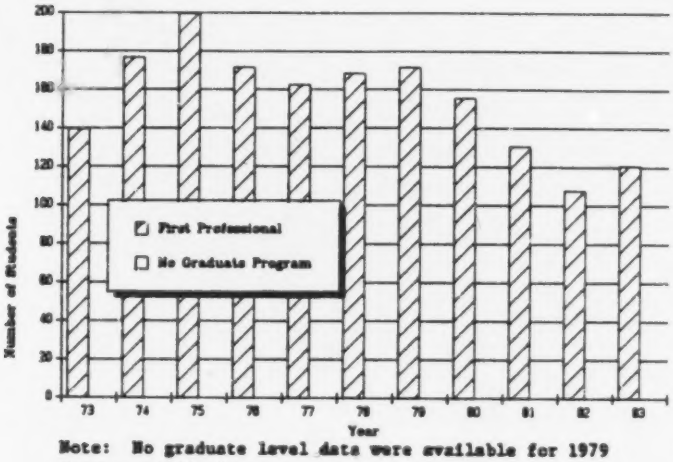


* No pharmacy school

Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections

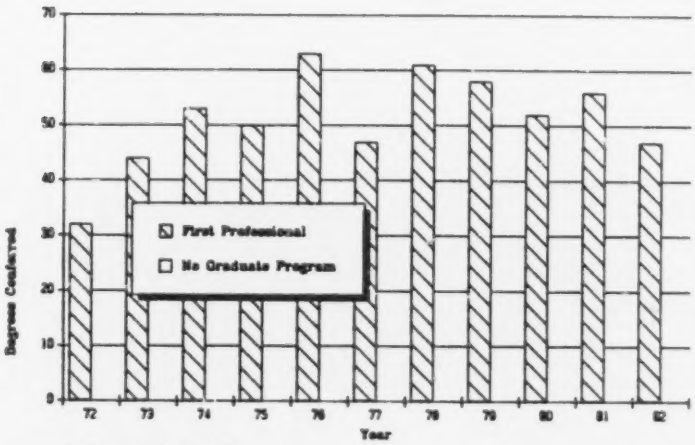
Source: Tables 14 and 15

Figure 1
Enrollment in Pharmacy Programs



Note: No graduate level data were available for 1979
Source: Table 4

Figure 3
Pharmacy Degrees Conferred



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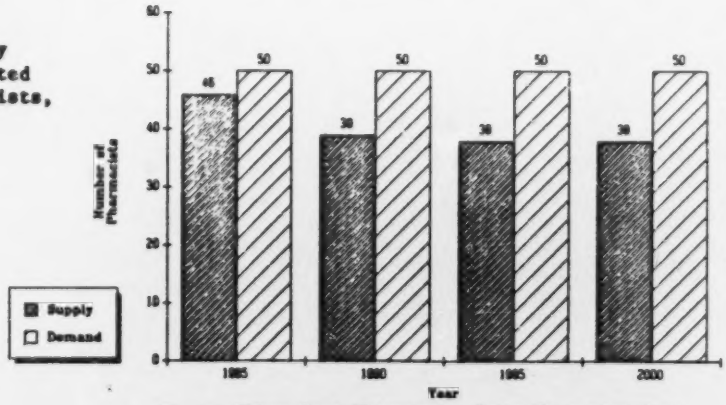

Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections
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NORTH DAKOTA

Figure 1
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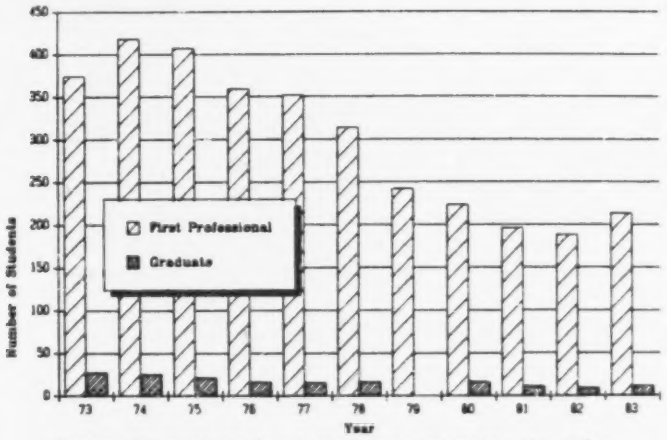

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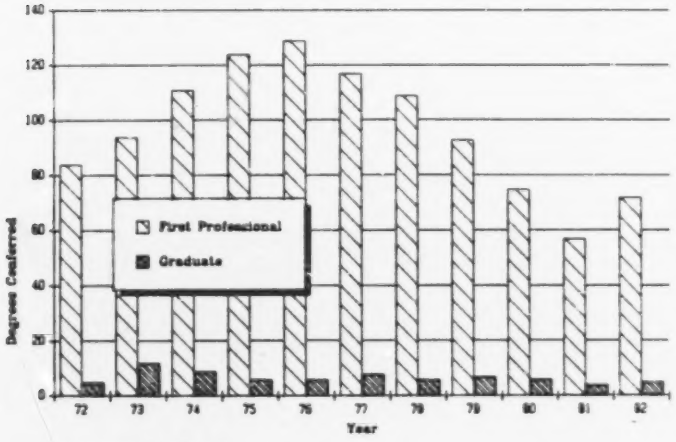

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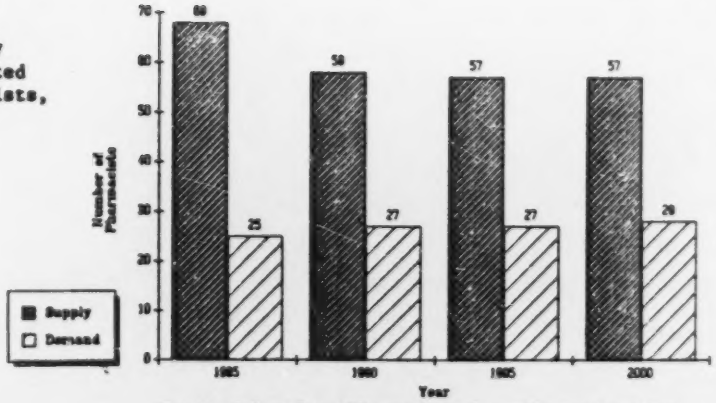

Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections
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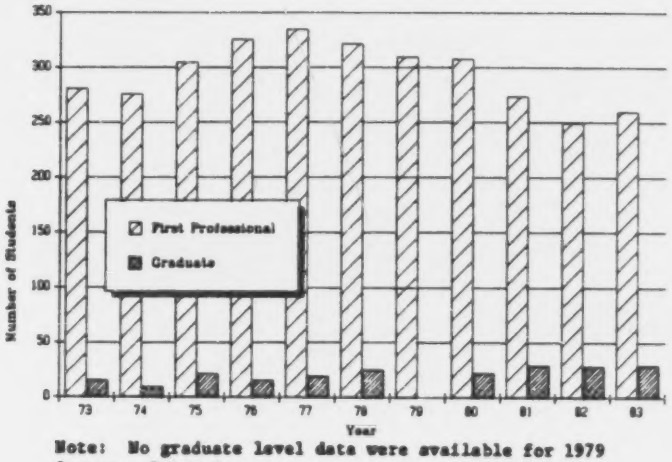

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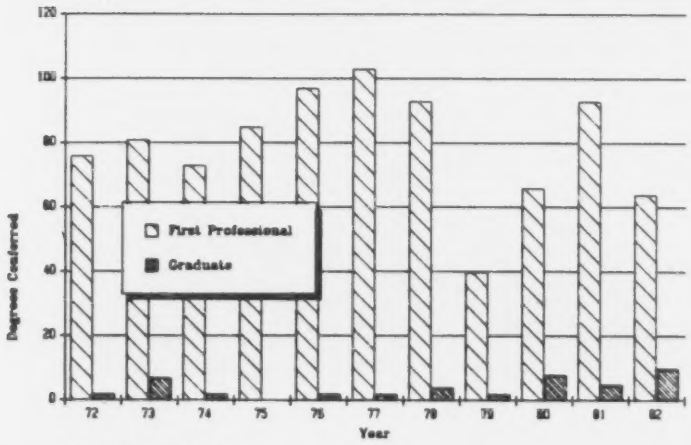

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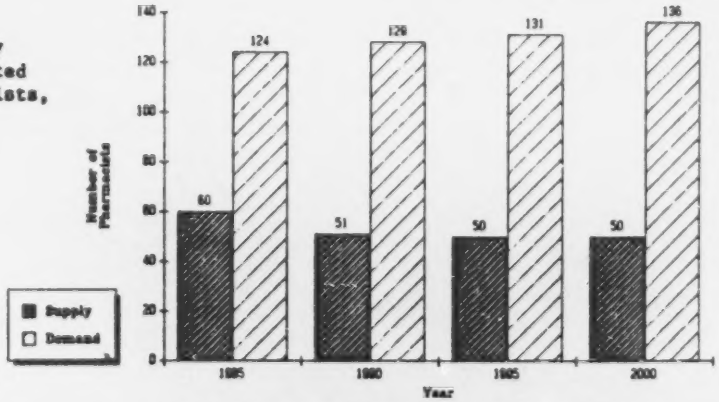

Note: Taken from Alternative 2 supply projections and Alternative 2 demand projections
Source: Tables 14 and 15

UTAH

Figure 1
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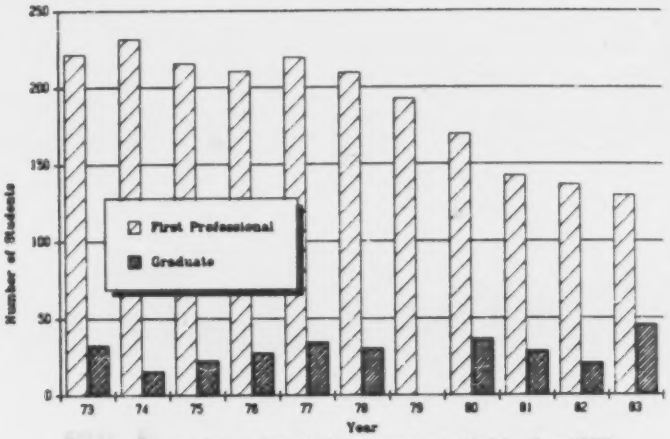

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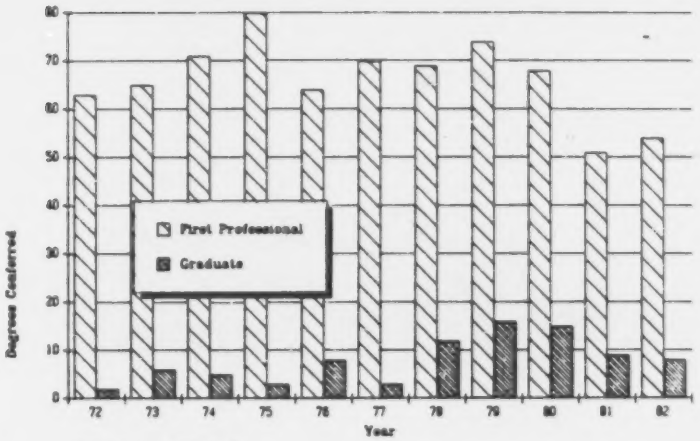

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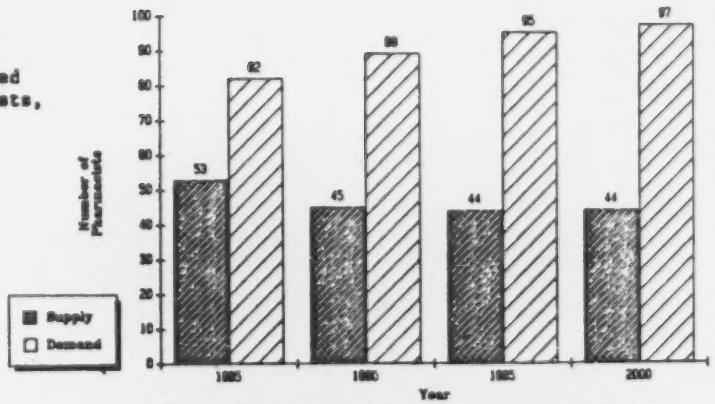

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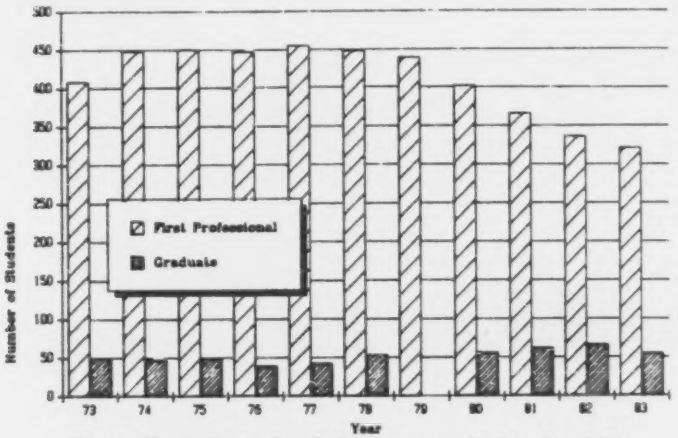

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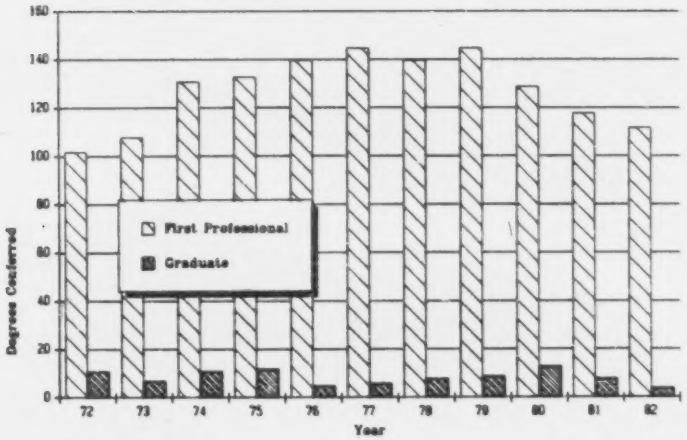

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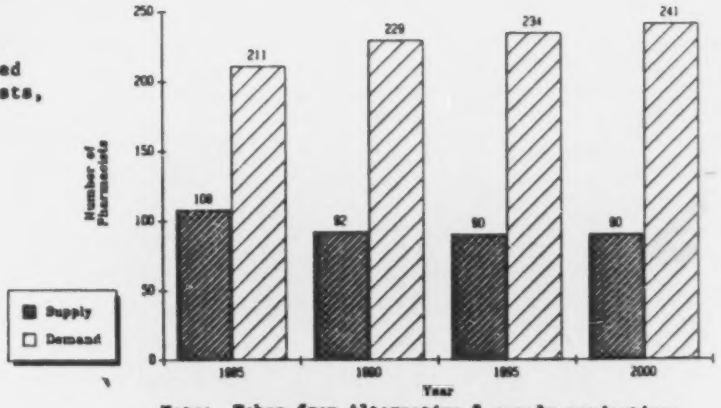

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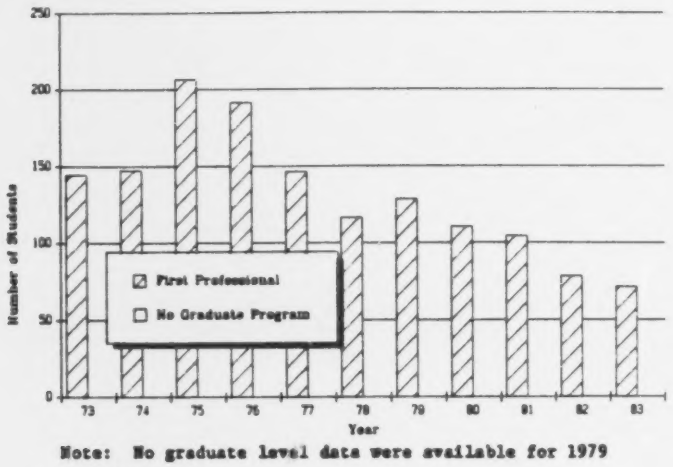

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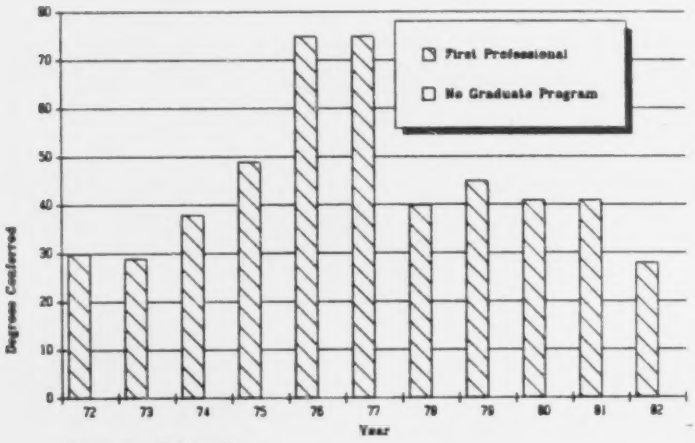

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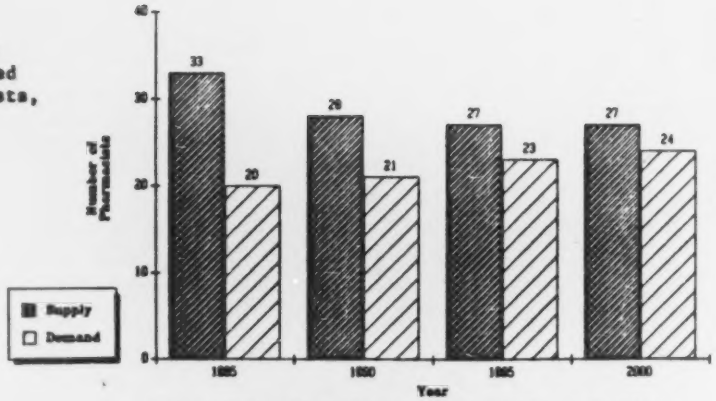

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